No. 16-1357

IN THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

ARCELORMITTAL and
ARCELORMITTAL ATLANTIQUE ET LORRAINE,

Plaintiffs-Appellants,

v.

AK STEEL CORPORATION,
SEVERSTAL DEARBORN, INC., and
WHEELING-NISSHIN INC.

Defendants-Appellees.

Appeal from the United States District Court for the District of Delaware
in Case No. 10-cv-00050, Judge Sue L. Robinson

BRIEF OF PLAINTIFFS-APPELLANTS ARCELORMITTAL AND ARCELORMITTAL ATLANTIQUE ET LORRAINE

Jeffrey B. Bove
NOVAK DRUCE CONNOLLY
BOVE + QUIGG LLP
1007 North Orange Street
P. O. Box 2207
Wilmington, DE 19899
(302) 658-9141

Constantine L. Trela, Jr.
Hugh A. Abrams
Bryan C. Mulder
SIDLEY AUSTIN LLP
One South Dearborn Street
Chicago, IL 60603
(312) 853-7000

Counsel for Plaintiffs-Appellants

FORM 9. Certificate of Interest

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

ArcelorMittal **v.** AK Steel Corporation

Case No. 16-1357

CERTIFICATE OF INTEREST

Counsel for the (petitioner) (appellant) (respondent) (appellee) (amicus) (name of party) appellants certifies the following (use "None" if applicable; use extra sheets if necessary):

1. The full name of every party or amicus represented by me is:

ArcelorMittal; ArcelorMittal Atlantique et Lorraine

2. The name of the real party in interest (Please only include any real party in interest NOT identified in Question 3. below) represented by me is:

Same

3. All parent corporations and any publicly held companies that own 10 percent of the stock of the party or amicus curiae represented by me are listed below. (Please list each party or amicus curiae represented with the parent or publicly held company that owns 10 percent or more so they are distinguished separately.)

ArcelorMittal

4. ☐ The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court (and who have not or will not enter an appearance in this case) are:

See attached Exhibit A

February 22, 2016
Date

/s/ Constantine L. Trela, Jr.
Signature of counsel

Please Note: All questions must be answered

Constantine L. Trela, Jr.
Printed name of counsel

cc: See attached Certificate of Service

Reset Fields

CERTIFICATE OF INTEREST

Exhibit A

The names of all law firms, partners and associates that have appeared on behalf of ArcelorMittal France and ArcelorMittal Atlantique et Lorraine in the District of Delaware, Case No. 1:10-cv-00050-SLR, or are expected to appear in this Court on behalf of ArcelorMittal and ArcelorMittal Atlantique et Lorraine, are:

1) OBLON, SPIVAK, McCLELLAND, MAIER & NEUSTADT, L.L.P. attorneys Jean-Paul Lavalleye, Barry J. Herman, Eric W. Schweibenz, Jeffrey B. McIntyre, and Thomas J. Fisher;

2) NOVAK DRUCE CONNOLLY BOVE + QUIGG LLP (formerly CONNOLLY, BOVE, LODGE & HUTZ) attorneys Jeffrey B. Bove and Chad S.C. Stover;

3) ARCELORMITTAL FRANCE attorney Jay L. Lazar;

4) SIDLEY AUSTIN LLP attorneys Constantine L. Trela, Jr., David T. Pritikin, Constantine Koutsoubas, Hugh Abrams, Linda Friedlieb, Benjamin M. Flowers, and Bryan C. Mulder; and

5) BARNES & THORNBURG LLP attorney Chad S.C. Stover.

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STATEMENT OF RELATED CASES

This appeal is from the United States District Court for the District of Delaware in Civ. No. 10-050-SLR ("the 050 case"). The 050 case was previously appealed to this Court in *ArcelorMittal France v. AK Steel Corp.*, No. 2011-1638, 700 F.3d 1314 (Fed. Cir. 2012). The panel consisted of Judge Dyk, Judge Clevenger, and Judge Wallach.

While the 050 case was on remand, ArcelorMittal France, ArcelorMittal Atlantique et Lorraine, and ArcelorMittal USA LLC filed related cases against AK Steel Corporation (Civ. No. 13-685-SLR ("the 685 case")) and Severstal Dearborn, LLC and Wheeling-Nisshin, Inc. (Civ. No. 13-686-SLR ("the 686 case")) in the United States District Court for the District of Delaware. The 050 case was again appealed, along with the 685 and 686 cases, in *ArcelorMittal France v. AK Steel Corp.*, Nos. 2014-1189, 2014-1190, and 2014-1191, 786 F.3d 885 (Fed. Cir. 2015). The panel consisted of Judge Dyk, Judge Wallach, and Judge Hughes.

JURISDICTIONAL STATEMENT

The district court had jurisdiction over this case under 28 U.S.C. §§ 1331 & 1338, although, as explained below, it was later divested of subject matter jurisdiction. It entered its final and appealable judgment on December 4, 2015. Plaintiffs-Appellants timely appealed, filing their notice of appeal on December 21, 2015. This Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

INTRODUCTION

This case concerns whether, consistent with longstanding Federal Circuit precedent, ArcelorMittal's[1] fully-executed covenant not to sue for infringement of U.S. Patent No. RE44,153 ("the RE153 patent") eliminated any possible case or controversy between the parties with respect to the two remaining claims of the RE153 patent and therefore deprived the district court of subject matter jurisdiction over Defendants' counterclaims seeking declaratory judgments of noninfringement and invalidity. The district court held that the covenant not to sue was ineffective because, although the covenant by its terms was unconditional, ArcelorMittal had asked that the covenant be formally entered once the court granted its motion to

[1] As used herein, "ArcelorMittal" includes Plaintiffs-Appellants ArcelorMittal and/or ArcelorMittal Atlantique et Lorraine, as well as ArcelorMittal's predecessor in interest, ArcelorMittal France.

amend the complaint in the 685 case to proceed on a different patent.[2] The district court granted the motion to amend in the 685 case, but in the same order declined to give effect to the covenant not to sue. Instead, the court granted summary judgment of invalidity and noninfringement, and found that this judgment "mooted" the covenant not to sue.

The district court erred. ArcelorMittal's offer of an unconditional covenant not to sue meant that Defendants could have no reasonable apprehension of being accused of infringing the RE153 patent. The claims of the RE153 patent actually asserted by ArcelorMittal had been held invalid, and the covenant against suit resolved any potential dispute involving the remaining claims, claims 24 and 25. There was no substantial controversy between the parties of sufficient immediacy and reality to warrant the issuance of a declaratory judgment. The district court therefore lacked subject matter jurisdiction over Defendants' declaratory judgment counterclaims, and should have granted ArcelorMittal's motion to dismiss.

Moreover, even if the district court had properly reached the merits of Defendants' motions for summary judgment (which it did not), Defendants' motion for summary judgment of obviousness should have been denied due to the

[2] ArcelorMittal's amended complaint in the 685 case substitutes allegations of infringement of a new reissue patent, U.S. Patent No. RE44,940 ("the RE940 patent"), for the allegations regarding the RE153 patent.

existence of disputed issues of material fact and changed circumstances since the time of the prior jury trial.

QUESTIONS PRESENTED

1. Whether the district court erred in granting summary judgment of noninfringement and invalidity with respect to patent claims over which the court lacked subject matter jurisdiction.

2. Whether the district court erred in finding claims 24 and 25 of the RE153 patent invalid as a matter of law based on an outdated trial record that related to a different patent and did not consider the prosecution history, claim limitations, and secondary considerations specific to claims 24 and 25.

STATEMENT OF THE CASE

I. Proceedings Below

ArcelorMittal France and ArcelorMittal Atlantique et Lorraine filed the 050 case on January 22, 2010, alleging that AK Steel Corporation, Severstal Dearborn, and Wheeling-Nisshin, Inc. infringed, directly or indirectly, one or more claims of U.S. Patent No. 6,296,805 ("the '805 patent"). (A72-82.) At Defendants' urging, the case proceeded on an expedited basis, with Defendants identifying two claim terms on which they would base their noninfringement contentions — "hot-rolled steel sheet coated with an aluminum or aluminum alloy coating" and "the steel sheet has a very high mechanical resistance after thermal treatment." (A187; A3044.) The district court issued its claim construction order on December 16,

2010, adopting Defendants' proposed constructions of those terms. (A3042-56.) The case was tried before a jury, which on January 14, 2011, returned a verdict of noninfringement and invalidity due to anticipation and obviousness as to all five asserted claims.[3] *ArcelorMittal France v. AK Steel Corp.*, 700 F.3d 1314, 1319 (Fed. Cir. 2012) ("*ArcelorMittal I*").

ArcelorMittal appealed. In an opinion issued on November 30, 2012, this Court affirmed-in-part, reversed-in-part, and remanded for a new trial as to literal infringement and obviousness. *ArcelorMittal I*, 700 F.3d at 1326. The Court held that the district court's construction of the "hot-rolled steel sheet" limitation was erroneous and that the jury's finding of anticipation was not supported by substantial evidence. The Court remanded for a new trial to consider infringement and evidence of commercial success of the asserted claims under the proper claim construction.

After the remand, the Patent Office reissued the '805 patent as the RE153 patent. (A64.) ArcelorMittal sought leave to amend the complaint in the 050 case to substitute claims 1, 2, 5, 7, and 16 of the RE153 patent for the asserted claims of the '805 patent. (A4231, A4237 (noting that claims 1, 2, 5, 7, and 16 are substituted); A4266.)

[3] The asserted claims were claims 1, 2, 5, 7, and 16. (A2570.)

ArcelorMittal also filed the 685 and 686 cases against Defendants, alleging infringement of the RE153 patent based on Defendants' activities subsequent to the trial in the 050 case. (A4267-68.) In response, Defendants moved in the 050 case for summary judgment of noninfringement and that claims 1 through 23 of the RE153 patent were invalid as improperly broadened in violation of 35 U.S.C. § 251. (A4501; A4513; A4515; A4539-40.) Defendants moved to dismiss the 685 and 686 cases on the same basis. (685 case, D.I. 5 (Apr. 23, 2013); 686 case, D.I. 8 (May 13, 2013).) The district court granted Defendants' motions in all three cases by invalidating claims 1 through 23 of the RE153 patent, and *sua sponte* also invalidated claims 24 and 25. (A4803; A4867-69.) The district court denied ArcelorMittal's motion to amend the complaint in the 050 case as moot. (A4803 n.13.) The court entered judgment in favor of Defendants in all three cases.

ArcelorMittal appealed the three adverse judgments, and the three appeals were consolidated into a single proceeding. In an opinion issued on May 12, 2015, this Court held that the district court properly held claims 1-23 invalid, but erred with regard to claims 24 and 25. The Court affirmed-in-part, reversed-in-part, and remanded for further proceedings with respect to claims 24 and 25. *ArcelorMittal France v. AK Steel Corp.*, 786 F.3d 885, 892 (Fed. Cir. 2015) ("*ArcelorMittal II*").

On remand, ArcelorMittal moved to dismiss the 050 case for lack of subject matter jurisdiction, because all of the asserted claims had been held invalid by this

Court, and ArcelorMittal had never asserted, and did not intend to assert, remaining claims 24 and 25 of the RE153 patent. (A4943; A4947-59.) Defendants filed motions for summary judgment of invalidity and noninfringement. (A4960; A4986.) ArcelorMittal subsequently tendered a covenant not to sue, confirming that it was not asserting, and would not assert, the only remaining claims of the RE153 patent, claims 24 and 25. (A5218-22.) Instead, ArcelorMittal indicated that it intended to proceed in the 685 case on the RE940 patent, not the RE153 patent. The district court nonetheless refused to dismiss the 050 case and, instead, granted Defendants' motions for summary judgment. (A4-15.) This appeal followed.

II. Statement of Facts

A. The Invention

ArcelorMittal is one of the world's leading steel producers. While experimenting with ways to improve the steel ArcelorMittal supplied to the automobile industry, several ArcelorMittal employees developed the technology claimed in the '805, RE153, and RE940 patents. This new technology involved a steel having a high strength that was achieved by the addition of the element boron and the processing of the steel by hot-stamping. *ArcelorMittal I*, 700 F.3d at 1317-18. "[H]ot-stamping" is a process in which the steel is rapidly heated, stamped "into parts of the desired shape," and then rapidly cooled. *Id.* at 1317. The rapid

heating and rapid cooling of the boron-containing steel converts at least a portion the steel's crystalline microstructure into a form called martensite. *Id.* Steel having a martensitic microstructure is able to achieve high tensile strength, which means that it can be used to produce steel parts "thinner and lighter than [those] produced by other processes," without sacrificing strength. *Id.* at 1318. This combination of high strength and light weight makes hot-stamped boron-containing steel especially desirable for automobile manufacture. High strength provides greater crash protection, while reduced weight improves fuel efficiency. *Id.*

Though hot-stamping had existed for some years prior to ArcelorMittal's invention, its usefulness was significantly limited by the fact that hot-stamped steel tended to oxidize, which caused the buildup of "scale" on the steel's surface. *Id.* Scale had to be removed before the steel could be welded or painted, but doing so required "shot-blasting" — an expensive and environmentally undesirable process that weakens the steel. *Id.* In addition, oxidation results in decarburization — a loss of carbon through the steel's surface which also reduces the strength of the steel. (A3892.) ArcelorMittal discovered that application of an aluminum-based coating to the boron-containing steel prior to stamping prevented oxidation, thus solving the problems that theretofore had plagued hot-stamping. *ArcelorMittal I*,

700 F.3d at 1317. The result was a steel that can be efficiently pressed into the strong, lightweight sheets coveted by automakers.

ArcelorMittal sought patent protection for its invention, and the Patent Office issued the '805 patent on October 2, 2001. (A68-71.) This patent contained a single independent claim and fifteen dependent claims. The independent claim — claim 1 — reads as follows:

> 1. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:
>
> 0.15%<carbon<0.5%
>
> 0.5%<manganese<3%
>
> 0.1%<silicon<0.5%
>
> 0.01%<chromium<1%
>
> titanium<0.2%
>
> aluminum<0.1%
>
> phosphorus<0.1%
>
> sulfur<0.05%
>
> 0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.

(A70-71.)

B. Commercial Impact of the Invention

ArcelorMittal's USIBOR® 1500-P is the commercial embodiment of the claimed invention. (A3817, A3821.) The high strength and light weight of USIBOR® 1500-P makes it possible to make automobile parts far thinner and lighter than before, improving fuel efficiency, while still providing excellent crash-worthiness. (A3754-55; A3771; A3947-48.) Automakers began working with USIBOR® 1500-P in 2004 or 2005, and it first appeared in automobiles in 2006. (A3949-50.) Its use has expanded dramatically since then, with sales doubling between 2007 and 2009. (A3946.) All major automakers now use USIBOR® 1500-P. (A3755; A3949.)

Almost immediately after ArcelorMittal began promoting USIBOR® 1500-P, its competitors, including Defendants, began trying to duplicate it. Prompted by inquiries from automakers and others, Defendants recognized that demand existed for aluminum-coated boron-containing steel that could be hot-stamped without oxidation, and therefore launched programs to develop their own versions of USIBOR® 1500-P (A3775-76, A3779-80, A3785, A3798; A3857) — programs that included obtaining and analyzing samples of ArcelorMittal's product (A3777-78, A3788-91, A3799-801). Both AK Steel and Severstal have aluminum-coated boron steel products designed for use in hot-stamping. (A3788, A3795, A3853.)

The '805 patent and introduction of USIBOR® 1500-P transformed not only the automotive industry (A3755), but the hot-stamping industry as well. For almost 20 years, the problems of scale and decarburization had limited hot-stamping's utility (A3904; 3944-45), and hot-stamping had remained a relatively small industry (A3945-47, A3950). Since ArcelorMittal introduced USIBOR® 1500-P, the hot-stamping industry has experienced enormous growth (A3981), expanding from perhaps 20 hot-stamping lines worldwide to 110 lines by 2012 (A3945).

C. Prior Litigation and Rulings

1. Proceedings Prior to the First Appeal

Litigation began in January 2010, when ArcelorMittal filed the 050 case against the three Defendants. (A72-82.) During claim construction, the parties disputed the meaning of two key limitations in claim 1 of the '805 patent. First, the parties disagreed concerning the proper construction of "hot-rolled steel sheet." ArcelorMittal argued that "hot-rolled steel sheet" meant a steel sheet that had been hot-rolled at any time during its production. *ArcelorMittal France v. AK Steel Corp.*, 755 F. Supp. 2d 542, 548-49 (D. Del. 2010), *aff'd in part, rev'd in part by ArcelorMittal I*, 700 F.3d 1314. The district court rejected that construction, and held that "hot-rolled steel sheet" referred only to steel that was "reduced to its final thickness by hot-rolling," and therefore did not refer to steel, like ArcelorMittal's

own product, that was "cold-rolled to its final thickness following initial hot-rolling." *ArcelorMittal I*, 700 F.3d at 1319-20. The second question during claim construction was what it means for steel to have a "very high mechanical resistance." *ArcelorMittal*, 755 F. Supp. 2d at 550-51. This, the district court held, means steel with an "ultimate tensile strength of 1500 MPa or greater." *ArcelorMittal I*, 700 F.3d at 1319.[4]

The only evidence of infringing acts at the time of trial pertained to steel sheets that had been hot-rolled at some point during their production, but not hot-rolled to their final thickness. Thus, under the district court's construction of "hot-rolled steel sheet," there was no evidence of literal infringement, nor did ArcelorMittal's own, highly successful product practice the asserted claims as construed. The district court therefore prohibited ArcelorMittal from asserting literal infringement at trial, and allowed the jury to consider infringement only under the doctrine of equivalents. *ArcelorMittal I*, 700 F.3d at 1322. (*See* A3277-78 (final jury instructions).)

On January 14, 2011, the jury returned a verdict finding that the accused products did not infringe the asserted claims, and that those claims were invalid as obvious and anticipated. (A3299-3305.) ArcelorMittal moved for judgment as a

[4] "Ultimate tensile strength" was used by the district court and the parties as a synonym for the claim term "mechanical resistance." "MPa" stands for "mega-Pascals," a measure of mechanical resistance.

matter of law on the invalidity issues, and for a new trial on infringement. *ArcelorMittal v. AK Steel Corp.*, 811 F. Supp. 2d 960, 963-64 (D. Del. 2011). The district court denied those motions (*id.* at 973), and ArcelorMittal appealed.

2. The First Appeal

On appeal, this Court affirmed-in-part, reversed-in-part, and remanded. The Court affirmed the district court's construction of "very high mechanical resistance." 700 F.3d at 1322. The majority held that this language limited claim 1 of the '805 patent, and each dependent claim, to steel with a mechanical resistance of 1,500 MPa or more.

The Court unanimously reversed the district court with respect to four other issues. First, this Court rejected the district court's determination that "hot-rolled steel sheet" referred only to steel that was hot-rolled to its final thickness. The Court noted that the '805 patent's specification "unambiguously contemplates cold-rolling." *Id.* at 1321. Therefore, it explained, the "hot-rolled" limitation covered steel sheets that were hot-rolled at some point during their production, even if they were cold-rolled to their final thickness. *Id.*

Second, the Court remanded for a new trial on literal infringement. As explained above, the district court had refused to allow a trial on literal infringement based on its erroneous construction of "hot-rolled steel sheet" — the district court understood that language to reach only steel sheets that had *never*

been cold-rolled, and there was no evidence of infringing acts related to such steel. But, this Court explained, ArcelorMittal's patents may have been literally infringed under a proper construction of "hot-rolled steel sheet." The Court therefore remanded with instructions to "address the issue of literal infringement under the correct claim construction." *Id.* at 1326.

Third, the Court remanded for a new trial on obviousness. The Court reasoned that the district court's erroneous construction of "hot-rolled steel sheet" prevented the jury from properly considering that issue. Among the factors relevant to determining obviousness, the Court explained, is the commercial success of the allegedly obvious invention. *Id.* at 1326. Although this Court held that the jury could properly have concluded that Defendants had established a *prima facie* case of obviousness, the district court's error in construing "hot-rolled steel sheet" meant that the jury was not able to consider the commercial success "of ArcelorMittal's cold-rolled embodiment." *Id.* at 1324, 1326. Accordingly, the Court vacated "the jury's obviousness verdict," and remanded for a new trial to consider the secondary consideration of commercial success "under the correct claim construction." *Id.*

Finally, the Court held that Defendants had failed to prove that ArcelorMittal's claims were invalid as anticipated. It therefore reversed the district

court's decision denying ArcelorMittal's motion for judgment as a matter of law as to anticipation. *Id.* at 1323.

ArcelorMittal sought rehearing with respect to certain aspects of the Court's decision, including the construction of "very high mechanical resistance," but its petition was denied on March 20, 2013. This Court's mandate issued on March 27, 2013.

3. The First Remand

Following the appeal, the proceedings were shaped by two relevant developments: the issuance of the RE153 patent and the filing of two new cases.

a. Reissue Proceedings

On August 8, 2011 — after the original jury verdict but before the original appeal — ArcelorMittal filed an application for reissuance of the '805 patent. (A64.) On April 16, 2013, four months after the decision in *ArcelorMittal I*, the Patent Office granted the application, and issued the RE153 patent. (A64.) The specification and claims 1 through 16 of the RE153 patent are identical to those in the '805 patent — each was carried over *verbatim* from the original. The only changes were the additions of dependent claims 17 through 25. Of these, claims 23, 24, and 25 were of particular importance during the first remand. They read:

> 23. The coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1000 MPa.
>
> 24. The coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1500 MPa.

> 25. The coated steel sheet of claim 24 that is composed predominantly of martensite.

(A67.)

During the reissue proceedings, ArcelorMittal had kept the Patent Office apprised of developments in the litigation (A64 (cover of RE153 patent, listing court filings and other documents considered by the Patent Office)),[5] and the Patent Office issued the RE153 patent after being informed of this Court's decision in *ArcelorMittal I* (*id.*).

After the Patent Office issued the RE153 patent, the parties stipulated to the substitution of claims 1, 2, 5, 7, and 16 of the RE153 patent for the previously-asserted claims 1, 2, 5, 7, and 16 of the '805 patent in the remanded 050 case. (A4237, ¶ 14 (proposed amended complaint substituting specific claims); A4306 (Defendants agreeing to the proposed substitution).) Defendants opposed any other amendment to the complaint in the 050 case, and the district court ultimately denied ArcelorMittal's motion to amend. (A4306-07; A4803 n.13.)

b. The 685 and 686 Cases

On April 16, 2013, the same day the RE153 patent issued, ArcelorMittal filed the 685 case in the district court. The complaint alleged that AK Steel directly infringed, contributorily infringed, and induced infringement of one or

[5] These materials included materials reflecting the jury's invalidity findings with respect to the '805 patent. (A64.)

more claims of the RE153 patent. (685 case, D.I. 1, ¶¶ 14-20 (Apr. 16, 2013).) Specifically, the complaint alleged that AK Steel made, sold, or offered for sale — and contributed to and induced the making of, selling of, or offering for sale of — hot-rolled steel with a mechanical resistance of at least 1000 MPa. (*Id.*, ¶ 18.) It further alleged that some of these acts of infringement involved steel with a mechanical resistance of 1,500 MPa or more. (*Id.*) On the same day, ArcelorMittal also filed a new complaint against Severstal and Wheeling-Nisshin, making materially identical allegations. This complaint initiated the 686 case. (686 case, D.I. 1 (Apr. 16, 2013).)

ArcelorMittal filed these new complaints to address acts of infringement separate and distinct from those at issue in the 050 case. Specifically, the 685 and 686 cases alleged new acts of infringement that occurred after the conclusion of the trial in the 050 case. These new acts of infringement included the fact that Defendants began supplying steel to hot-stampers who would stamp the steel to achieve an ultimate tensile strength greater than 1,500 MPa.

c. Proceedings in the 050 Case

On remand, the 050 case proceeded with the substitution of the asserted claims of the RE153 patent for the asserted claims of the ‘805 patent, but no other amendments to the Complaint. *See* 35 U.S.C. § 252 (“[B]ut in so far as the claims of the original and reissued patents are substantially identical, such surrender shall

not affect any action then pending nor abate any cause of action then existing"). Defendants moved for summary judgment of noninfringement and invalidity of claims 1 through 23 — but not claims 24 and 25 — of the RE153 patent. (A4539-40 (AK Steel's brief in support of its motion for summary judgment, explaining that the relief it sought "would leave claims 24-25 of the RE153 patent for the limited determination on obviousness"); A4513 (noting that Severstal and Wheeling-Nisshin joined AK Steel's invalidity argument).) Defendants' invalidity arguments depended entirely on alleged impermissible broadening, *i.e.*, an alleged violation of the rule that reissue patents may not "enlarge[e] the scope of the claims of the original patent." 35 U.S.C. § 251. They argued that the original claims covered only steel with a mechanical resistance in excess of 1,500 MPa, and that reissue claims 1 through 23 impermissibly broadened the original claims by reaching steel with a lower mechanical resistance — specifically, a mechanical resistance in excess of 1,000 MPa. (A4539-40.) Defendants expressly limited their motion to claims 1 through 23, recognizing that reissue claims 24 and 25 reached only steel with a mechanical resistance greater than 1,500 MPa, and were therefore no broader than the claims of the '805 patent as construed in *ArcelorMittal I*. (*Id.*)

In response, ArcelorMittal argued that because reissue claim 1 was identical to original claim 1, the claims necessarily were of the same scope. (A4720-22.)

The Patent Office's issuance of reissue claim 23 — which claimed the steel sheet of claim 1, with mechanical resistance in excess of 1000 MPa — made clear that, properly construed, reissue claim 1 reached steel sheets with a mechanical resistance of 1000 MPa or more. ArcelorMittal argued that, in light of this Patent Office determination, the original, narrower construction of the identical language in the '805 patent claims should be reconsidered. (A4719.) Such reconsideration was not precluded by this Court's decision in *ArcelorMittal I*, ArcelorMittal argued, because the Patent Office's action was a new development that implicated an exception to the mandate rule. (*Id.*)

The district court granted Defendants' motion (A4800, A4803), holding that the original claim construction governed the scope of the '805 patent claims. The court also held, *sua sponte*, that every claim in the RE153 patent — including claims 24 and 25 — was invalid because claims 1 through 23 had, in the court's view, impermissibly broadened the scope of the '805 patent. (A4803 ("[D]efendants' motions for summary judgment are granted based on the court's invalidating the RE153 patent…").)

ArcelorMittal filed a Rule 59 motion, requesting that the judgment be modified to clarify that the court's order, like Defendants' motions, reached the validity only of claims 1 through 23, and did not actually hold claims 24 and 25 invalid. (A4814-26.) The district court denied ArcelorMittal's motion. It held

that whether to invalidate the entire RE153 patent was a policy decision left to its judgment. (A4868 ("Whether a broadening reissue patent … should be held entirely invalid is a question of policy").) And, according to the district court, sound policy dictated that it hold invalid every claim in the RE153 patent, including claims 24 and 25. (A4869.) In its order, the district court noted that claims 24 and 25 were part of the 685 and 686 cases; it made no similar observation concerning the 050 case. (A4869 n.4.) The court then reentered judgment against ArcelorMittal. (A4872.)

d. Proceedings in the 685 and 686 Cases

On December 5, 2013, the district court also entered judgment in favor of Defendants in the 685 and 686 cases. (685 case, D.I. 19 (Dec. 5, 2013); 686 case, D.I. 17 (Dec. 5, 2013).) The district court explained that the judgments were entered "[f]or the reasons stated in the memorandum opinion and order" filed in the 050 case. (685 case, D.I. 21 (Dec. 5, 2013); 686 case, D.I. 19 (Dec. 5, 2013).) In other words, because the district court had held the RE153 patent invalid in its entirety, and because the 685 and 686 cases alleged infringement of that patent, Defendants were entitled to judgment in those cases as well.

4. The Second Appeal

ArcelorMittal again appealed in the 050 case, and also appealed in the 685 and 686 cases. This Court consolidated the three appeals.

ArcelorMittal argued that the judgments should be reversed because the district court should have reconsidered the construction of "very high mechanical resistance" in light of the new evidence developed following *ArcelorMittal I*, in particular, the further prosecution history that led to the allowance of the RE153 claims. *ArcelorMittal II*, 786 F.3d at 888. ArcelorMittal further argued that, even if reissued claims 1 through 23 were invalid for improper broadening, the district court's judgment should be reversed as to claims 24 and 25, because it was undisputed that those claims did not have a broader scope than the original claims of the '805 patent. (*ArcelorMittal France v. AK Steel Corp.*, No. 2014-1189, D.I. 25 at 39-54 (Apr. 2, 2014).) ArcelorMittal requested a remand of all three cases for further proceedings. (*Id.* at 54-55.)

In an opinion dated May 12, 2015, this Court affirmed with respect to reissued claims 1 through 23, but reversed with respect to claims 24 and 25. *ArcelorMittal II*, 786 F.3d at 892. The Court held that the district court properly concluded that it was bound by the original claim construction of "very high mechanical resistance," and that therefore claims 1-23 of the RE153 patent had been impermissibly broadened. *Id.* The Court held that, because the parties agreed that claims 24 and 25 "were not broadened on reissue," there was no justification for invalidating those claims. *Id.* at 890-92. The Court affirmed-in-part, reversed-

in-part, and remanded for further proceedings "consistent with this opinion and our mandate in *ArcelorMittal I*." *Id.* at 892.

5. The Second Remand

a. The Issuance of the RE940 Patent

On June 10, 2014, while *ArcelorMittal II* was pending, the Patent Office issued the RE940 patent. (685 case, D.I. 31-1 at 9.) The RE940 patent is a continuation of the RE153 patent, and includes new claims 17-29. (*Id.* at 11, 13-14.) RE940 patent claims 17-29, unlike claims 1-23 of the RE153 patent, are expressly limited to steel with "a very high mechanical resistance in excess of 1500 MPa," and therefore are not subject to any argument that they were impermissibly broadened. (*Id.* at 13-14.) Certain of the claims also include limitations directed to the microstructure of the steel (*id.*), which distinguishes the claims over certain of the prior art references previously cited by Defendants.

b. Proceedings in the District Court

When the 050 case was remanded, ArcelorMittal decided not to assert the surviving claims (24 and 25) of the RE153 patent against Defendants. Thus, ArcelorMittal chose not to amend its complaint to assert those claims in the 050 case, and instead moved to dismiss the case. (A4950.) ArcelorMittal also moved

in the 685 case[6] to substitute the RE940 patent for the RE153 patent. (685 case, D.I. 31 (Jul. 29, 2015).)[7]

Defendants, however, took the position that claims 24 and 25 *were* at issue in the 050 case, despite never having been asserted by ArcelorMittal. Defendants argued that pursuant to 35 U.S.C. § 252, any claim of the RE153 patent that was "identical" to any claim of the '805 patent *automatically* became asserted upon the issuance of the RE153 patent. (A5121-22.) Defendants also relied on ArcelorMittal's request for a remand of the 050 case before this Court as indicating that claims 24 and 25 were asserted in the 050 case. (A5050.) Defendants moved for summary judgment of invalidity and noninfringement based on the original trial record, the January 2011 jury verdict, and this Court's mandate in *ArcelorMittal I*. (A4960; A4986.)

ArcelorMittal opposed Defendants' summary judgment motion, noting that the district court lacked subject matter jurisdiction over Defendants' declaratory

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[6] Prior to the second remand, AK Steel purchased all relevant assets of Severstal. (A5242.) Accordingly, ArcelorMittal's allegations against Severstal are now part of the 685 case as well. Although not yet formally dismissed, the parties do not intend to continue the 686 case. (A5242, A5244.)

[7] ArcelorMittal also moved to amend in the 685 case to substitute ArcelorMittal as plaintiff instead of ArcelorMittal France, due to a change of ownership of the RE153 and RE940 patents. (685 case, D.I. 31-1, ¶ 10 (Jul. 29, 2015).) No such amendment was sought in the 050 case. Accordingly, not only were claims 24 and 25 of the RE153 patent not asserted in the 050 case, but all necessary parties who *could* assert those claims were not even party to the case.

judgment counterclaims given that ArcelorMittal was not asserting the only surviving claims of the RE153 patent, claims 24 and 25. ArcelorMittal argued that 35 U.S.C. § 252 did not cause an automatic substitution of non-asserted claims, but that an amendment to the complaint or agreement of the parties was required for the reissue claims to be asserted. (A5101-04.) ArcelorMittal noted that it had requested that this Court remand any surviving claims of the RE153 patent solely to allow it the option to assert those claims with respect to the pre-trial acts of infringement at issue in the 050 case, an option it had not exercised. (A5101-02.) In any event, to avoid any doubt, ArcelorMittal offered a covenant not to sue Defendants and their customers on the RE153 patent. (A5103.) ArcelorMittal included a final, executed copy of the covenant with a letter sent to the district court and Defendants on November 18, 2015. (A5218-22.) The covenant provided:

> Plaintiffs ArcelorMittal France ("AMF"), ArcelorMittal Atlantique et Lorraine ("AMAL"), ArcelorMittal USA LLC ("AM USA"), and putative Plaintiff ArcelorMittal ("AM") hereby irrevocably covenant not to sue Defendants AK Steel Corporation ("AK"), Severstal Dearborn, LLC ("SD") and Wheeling-Nisshin, Inc. ("WN"), and the customers of AK, SD, and WN, under U.S. Reissued Patent No. RE44,153 ("the RE153 Patent") for any use of the RE153 Patent and all actions in connection with manufacture and sale of aluminum coated, boron-containing steel sheet products in the United States, including without limitation making, having made, using, having used, selling, having sold, offering for sale, having offered for sale and importing,

> or having imported, aluminum coated, boron-containing steel sheet products. To be clear, this covenant not to sue is limited to the RE153 patent and shall not apply with respect to any patent related to the RE153 patent, including U.S. Reissued Patent No. RE44,940.

(A5220-21.)

The covenant itself was unconditional, but ArcelorMittal requested in its letter to the court that the covenant not be formally entered until after its motion to amend the complaint to substitute the RE940 patent in the 685 case was granted. (A5218.) ArcelorMittal made this request to preclude Defendants from arguing that the 685 case — which at that point involved only the RE153 patent — was moot, which would mean that ArcelorMittal would be required to file an entirely new case alleging infringement of the RE940 patent. But, regardless, it was clear that ArcelorMittal had not asserted, and had no intention of ever asserting, claims 24 and 25 of the RE153 patent against Defendants.

With respect to the merits of Defendants' summary judgment motions, ArcelorMittal argued that it would be improper to grant summary judgment on the stale trial record. In particular, claim 25 included a limitation, "composed predominantly of martensite," that had not been construed, was not the subject of any testimony (fact or expert), and had not been considered by the jury in 2011 because it did not exist at the time (A5092), so the jury's prior obviousness finding had no bearing on claim 25. Moreover, with respect to both reissue claims, the

prosecution history, commercial sales, and other evidence of secondary considerations that emerged after the jury trial should be considered. (A5090-93.) In particular, although Defendants' steel at issue in the 2011 trial had not been subjected to a thermal treatment to achieve mechanical resistance greater than 1,500 MPa, after the 2011 trial Defendants' steel was being subjected to such treatment and was achieving the claimed mechanical resistance. (A5088-90.) These were new acts of infringement that had not been addressed, and could not have been addressed, in the 2011 trial. ArcelorMittal relied on a declaration submitted pursuant to Fed. R. Civ. P. 56(d) detailing the discovery that it would take regarding these new infringements and commercial success and the facts that it expected this discovery to show. (A4741-44.) The jury also had never considered the commercial success of ArcelorMittal's own product, due to the district court's erroneous construction of "hot-rolled" that this Court reversed in *ArcelorMittal I*. *ArcelorMittal I*, 700 F.3d at 1325. Moreover, the fact that the Patent Office had allowed claims 24 and 25 despite being presented with Defendants' obviousness arguments and prior art is a changed circumstance that should be considered in the obviousness inquiry. (A5075-76.)

The district court, in an opinion dated December 4, 2015, denied ArcelorMittal's motion to dismiss and granted Defendants' motions for summary judgment of noninfringement and obviousness. With respect to infringement, the

court limited the inquiry to infringement prior to the jury trial, and found "given that plaintiffs are not asserting pre-trial acts of infringement, I find that there are no genuine issues of material fact as to infringement of claims 24 and 25 of the RE153 patent." (A12.) With respect to invalidity, the court treated the jury's 2011 obviousness finding with respect to the asserted '805 patent claims as establishing *prima facie* obviousness of reissue claims 24 and 25, despite acknowledging that claim 25 included the new "composed predominantly of martensite" limitation and that Defendants (who bore the burden of proof) had not "address[ed] this limitation specifically with respect to invalidity." (A14 n.16.) The district court refused to consider the post-trial reissue prosecution history of claims 24 and 25. (A13-14.) The court also declined to address post-trial commercial success evidence or any other evidence of secondary considerations. (A14.)

In the same opinion, the district court also granted ArcelorMittal's motion to amend the complaint in the 685 case. (A15.) But rather than give effect to ArcelorMittal's covenant not to sue, the court concluded that Defendants' summary judgment motions should be granted, "thus mooting plaintiffs' proposed covenant not to sue." (A15.) Curiously, the district court conceded that "if plaintiffs had simply filed the covenant … they could have avoided the entry of judgment" (A15 n.17), apparently drawing a distinction between a covenant not to

sue that has been filed with the court and the fully-executed covenant not to sue that ArcelorMittal submitted by letter to the court and Defendants.

SUMMARY OF ARGUMENT

ArcelorMittal's grant of a covenant not to sue Defendants and their customers deprived the district court of subject matter jurisdiction over the only remaining valid claims of the RE153 patent. The covenant confirmed that ArcelorMittal was not asserting, and would not assert, claims 24 and 25 of the RE153 patent. That meant that Defendants faced no affirmative claims, and that there was no case or controversy with respect to Defendants' declaratory judgment counterclaims. The tender of the covenant was more than sufficient to demonstrate that there was no live dispute between the parties to support subject matter jurisdiction. The actual delivery of the fully-executed covenant to Defendants and the district court only further confirmed the absence of any case or controversy. And even under the district court's erroneous view that the covenant was ineffective because it was purportedly conditional, there is no dispute that the purported condition was met, and the covenant therefore became effective, at the same time that the court addressed ArcelorMittal's motion to dismiss. Moreover, the only remaining claims of the RE153 patent, claims 24 and 25, were never asserted in the 050 case in the first place. In these circumstances, the district court erred in holding that it had subject matter jurisdiction. The district court's order

denying ArcelorMittal's motion to dismiss, and granting Defendants' motions for summary judgment of noninfringement and obviousness, should be reversed.

In the alternative, Defendants' motion for summary judgment of obviousness should have been denied on the merits. The district court improperly applied the jury's prior findings regarding obviousness and secondary considerations — findings that were made with regard to different claims of a different patent — without ever construing those claims or considering the evidence specific to the RE153 patent, contrary to the requirement of 35 U.S.C. § 282 that each claim be independently presumed valid. This evidence includes the subsequent prosecution history, in which the Patent Office allowed the claims despite being presented with Defendants' invalidity arguments, the jury's invalidity decisions, and this Court's decision in *ArcelorMittal I*. It also includes a claim, claim 25 of the RE153 patent, with different limitations, the validity of which was never previously considered by the jury or by this Court. Moreover, the district court improperly refused to consider evidence of secondary considerations arising after the original trial. The summary judgment of obviousness should therefore be vacated.

STANDARD OF REVIEW

This Court reviews a district court's denial of a motion to dismiss for lack of subject matter jurisdiction *de novo*. *Hewlett-Packard Co. v. Acceleron LLC*, 587

F.3d 1358, 1361 (Fed. Cir. 2009). It reviews underlying factual findings for clear error. *Id.*

This Court also reviews "*de novo* the trial court's grant of summary judgment." *Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1362 (Fed. Cir. 1998). "Whether the claimed subject matter would have been obvious to an ordinarily skilled artisan at the time of the invention 'is a question of law based on underlying questions of fact.'" *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1353 (Fed. Cir. 2013) (quoting *Green Edge Enters., LLC v. Rubber Mulch Etc. LLC*, 620 F.3d 1287, 1298 (Fed. Cir. 2010)). "The underlying factual inquiries include: (1) 'the scope and content of the prior art'; (2) 'differences between the prior art and the claims at issue'; (3) 'the level of ordinary skill in the pertinent art'; and (4) relevant objective considerations, including 'commercial success, long felt but unsolved needs, [and] failure of others.'" *Id.* (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007)). "Obviousness must be proved by clear and convincing evidence." *Id.* "Thus, the inquiry on summary judgment is whether a jury applying the clear and convincing evidence standard could reasonably find, based on the evidence produced by the accused infringer, that the claimed invention was obvious." *Id.*

ARGUMENT

I. The District Court Erred By Denying ArcelorMittal's Motion To Dismiss.

A. The Covenant Not to Sue Divested the District Court of Subject Matter Jurisdiction.

The district court erred by refusing to give effect to ArcelorMittal's covenant not to sue and consequently failing to dismiss the case for lack of subject matter jurisdiction. Subject matter jurisdiction over declaratory judgment counterclaims requires "a substantial controversy, between parties having adverse legal interests, of sufficient immediacy and reality to warrant the issuance of a declaratory judgment." *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 127 (2007) (citation omitted). The party asserting the declaratory judgment claim "bears the burden of proving the existence of such a controversy throughout the litigation." *Dow Jones & Co. v. Ablaise Ltd.*, 606 F.3d 1338, 1345 (Fed. Cir. 2010). "[A] covenant not to sue for patent infringement divests the trial court of subject matter jurisdiction over claims that the patent is invalid, because the covenant eliminates any case or controversy between the parties." *Id.* at 1346.

The covenant ArcelorMittal granted was, by its terms, unconditional. (A5220-21.) It covered Defendants and their customers, and promised that ArcelorMittal would not sue any of them for any and all uses of the RE153 patent. (*Id.*) The covenant "extinguished any current or future case or controversy

between the parties, and divested the district court of subject matter jurisdiction." *Dow Jones*, 606 F.3d at 1348.

The district court here took issue with ArcelorMittal's request to have the covenant formally entered upon the granting of the motion to amend in the 685 case, acknowledging that but for that request, the court would have dismissed the 050 case. (A15 n.17.) But the district court *granted* ArcelorMittal's motion for leave to amend in the 685 case at the same time that it denied ArcelorMittal's motion to dismiss the 050 case. (A15.) By the district court's (and Defendants') own reasoning, the covenant became fully effective when the motion to amend was granted. The district court therefore lacked subject matter jurisdiction to rule on Defendants' declaratory judgment counterclaims, and should have granted ArcelorMittal's motion to dismiss.

Moreover, even had the district court not granted ArcelorMittal's motion to amend in the 685 case, ArcelorMittal's submission of the covenant not to sue and its related statements in the litigation were more than sufficient to show that there was no longer any "substantial controversy" between the parties "of sufficient immediacy and reality to warrant the issuance of a declaratory judgment." *MedImmune*, 549 U.S. at 127. ArcelorMittal had never asserted claims 24 and 25 and had moved on July 29, 2015 in the 685 case to amend its complaint, removing any claim for infringement of the RE153 patent. (685 case, D.I. 31 (Jul. 29,

2015).) And in ArcelorMittal's opening brief in support of its motion to dismiss in the 050 case, submitted on September 4, 2015, it stated that it was not asserting claims 24 and 25 of the RE153 patent (the only remaining claims) in the 050 case and that it was "prepared to grant a covenant against suit to Defendants for all claims of the RE153 patent." (A4956.) At least from this point on, it was clear that there was no actual controversy between the parties regarding claims 24 and 25 of the RE153 patent.

Indeed, the fact that there was no case or controversy was even clearer here than in *Dow Jones.* In that case, the proposed covenant not to sue was merely "offered," not finally executed and delivered, but this Court nevertheless found that the district court lacked subject matter jurisdiction. *See Dow Jones & Co. v. Ablaise Ltd.*, 583 F. Supp. 2d 41, 42 (D.D.C. 2008) (noting that Ablaise "offered a covenant not to sue Dow Jones on the '530 patent if Dow Jones would dismiss its claim of invalidity," but Dow Jones refused to do so); *Dow Jones*, 606 F.3d at 1345, 1349 (holding that proffer of covenant eliminated subject matter jurisdiction). Other courts similarly have held that a covenant not to sue deprives the court of subject matter jurisdiction even if it is partially conditional. *See, e.g.*, *Wundaformer, LLC v. Flex Studios, Inc.*, No. 15-cv-4802, 2015 WL 7181249, *1-2 (S.D.N.Y. Nov. 10, 2015) (finding that covenant not to sue deprived court of jurisdiction over invalidity counterclaims, even though covenant was conditioned

on the court's claim construction remaining unchanged on appeal); *Arista Techs., Inc. v. Arthur D. Little Enters., Inc.*, 125 F. Supp. 2d 641, 654-55 (E.D.N.Y. 2000) (covenant not to sue conditioned on dismissal of declaratory judgment counterclaims effectively deprived court of jurisdiction).

Accordingly, the proper inquiry was not, as the district court believed, whether the covenant was "conditional." (A15 n.17.) The proper inquiry was whether, under all the facts and circumstances, there existed any real and immediate substantial controversy between the parties regarding infringement of the RE153 patent. In light of ArcelorMittal's representations to the court and Defendants that it would not assert the RE153 patent in either the 050 case or the 685 (or 686) case, and its offer of a covenant not to sue, no such controversy existed. This only became more apparent when ArcelorMittal then delivered the fully-executed covenant to Defendants and the district court, and even more so when the court granted ArcelorMittal's motion to amend, fulfilling the purported condition identified by the court. The district court lacked subject matter jurisdiction over any further proceedings related to the RE153 patent, and so its order denying ArcelorMittal's motion to dismiss should be reversed.

B. The District Court Erred in Finding that Claims 24 and 25 Were Ever Asserted in the 050 Case.

1. The Issuance of the RE153 Patent did not Automatically Modify the Pleadings and Change the Asserted Claims.

Aside from the covenant not to sue, which was itself sufficient to divest the district court of subject matter jurisdiction, the district court also erred because claims 24 and 25 of the RE153 patent had never been asserted in the 050 case. In patent cases, "the existence of a 'case or controversy must be evaluated on a claim-by-claim basis.'" *Streck, Inc. v. Research & Diagnostic Sys., Inc.*, 665 F.3d 1269, 1281 (Fed. Cir. 2012) (*quoting Jervis B. Webb Co. v. So. Sys., Inc.*, 742 F.2d 1388, 1399 (Fed. Cir. 1984)). No case or controversy exists with respect to unasserted claims. *See Fox Grp., Inc. v. Cree, Inc.*, 700 F.3d 1300, 1308 (Fed. Cir. 2012) (vacating district court's determination of invalidity of unasserted claims); *Streck*, 665 F.3d at 1281 (district court did not err in limiting action to asserted claims because of lack of case or controversy with respect to other claims). Accordingly, even before ArcelorMittal offered the covenant not to sue, there was no subject matter jurisdiction over unasserted claims 24 and 25.

The pretrial order in the 050 case limited the asserted claims to claims 1, 2, 5, 7, and 16 of the '805 patent. (A2570, A2588-95.) During the first remand, ArcelorMittal only sought, and Defendants only agreed to, substitution of claims 1, 2, 5, 7, and 16 of the RE153 patent for the same claims of the '805 patent. (A4237,

¶ 14; A4306.) ArcelorMittal never amended its complaint, the pretrial order, or any other document to assert claims 24 and 25 of the RE153 patent.

The district court's contrary conclusion was erroneously based on 35 U.S.C. § 252, which provides that when a patent is surrendered for reissue:

> [S]uch surrender shall not affect any action then pending nor abate any cause of action then existing, and the reissued patent, to the extent that its claims are substantially identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent.

35 U.S.C. § 252. The district court concluded "that claims 24 and 25 of the RE153 patent were asserted in Civ. No. 10-050 as a matter of law" because they are purportedly "substantially identical" to claims of the '805 patent. (A10-11.) The district court's conclusion, however, contradicts the plain language of the statute. The statute provides that the surrender of a patent for reissue "shall *not* affect [an] action then pending." 35 U.S.C. § 252 (emphasis added). But, according to the district court, the surrender of the '805 patent *did* "affect [an] action then pending,"— the 050 case — by automatically causing all claims of the RE153 patent to be asserted in place of the specific claims of the '805 patent (claims 1, 2, 5, 7, and 16) that ArcelorMittal had formerly asserted. That type of automatic effect on pending litigation is precisely what 35 U.S.C. § 252 expressly prohibits.

The district court cited no authority holding that 35 U.S.C. § 252 operates automatically to change the asserted claims in a pending action as a matter of law,

and ArcelorMittal is aware of none. Indeed, at least one court has determined that the plaintiff *is* required to formally amend its complaint in order to maintain an action after a patent is reissued. *See Aspex Eyewear v. E'Lite Optik*, No. 3:98-cv-2996, 2002 U.S. Dist. LEXIS 24564, *4-5 (N.D. Tex. Dec. 20, 2002) (dismissing suit on original patent where patentee failed to move to amend to assert reissued claims). In other cases involving reissue during a pending case, although the district courts did not necessarily weigh in on whether amendment was required, the plaintiffs in fact amended their complaints in order to assert claims of the reissued patent. *See, e.g., Lam Research Corp. v. Schunk Semiconductor*, No. C-03-1335, 2014 WL 1364980, *1 (N.D. Cal. Apr. 7, 2014) (noting that plaintiff filed supplemental complaint to assert infringement of reissued patent); *Artemi Ltd. v. Safe-Strap Co., Inc.*, 947 F. Supp. 2d 473, 478-79 (D.N.J. 2013) (granting motion to amend complaint to assert allegedly identical reissued claim); *McDavid Knee Guard, Inc. v. Nike USA, Inc.*, No. 08 C 6584, 2010 WL 3003556, *1 (N.D. Ill. Jul. 28, 2010) (plaintiff moved to amend complaint to assert reissued claims). Here, the district court did not cite any cases where new claims in a reissue patent were deemed automatically asserted in a pending case without amendment of the complaint.

Indeed, the district court's interpretation of 35 U.S.C. § 252 would present significant practical difficulties. According to the district court, it is necessary to

determine whether claims of the reissue patent are "substantially identical" to original claims in order to determine which claims are even *at issue* in the litigation. But as one court held, "such a determination cannot be made at the pleading stage." *Artemi*, 947 F. Supp. 2d at 478. To determine whether claims are "substantially identical" will often require discovery and expert opinions. Waiting for the parties to undertake such discovery in order to determine which claims are even asserted in the litigation is illogical and inefficient. Requiring amendment of the complaint to assert reissue patent claims, in contrast, presents no such difficulty, and is consistent with normal practice in federal litigation.

2. ArcelorMittal's Request for a Remand in *ArcelorMittal II* Did Not Affect the Identity of the Claims Asserted in the 050 Case.

Although the district court did not accept the argument, Defendants urged that claims 24 and 25 of the RE153 patent should be deemed to have been asserted in the 050 case, despite the lack of an amended complaint, because of statements ArcelorMittal made in requesting a remand during the *ArcelorMittal II* appeal. In particular, Defendants cited ArcelorMittal's request "to remand the 050 case so that the District Court can address infringement of reissue claims 24 and 25." (A5058 (citing A5067-68).) Defendants' argument, however, ignored the circumstances in *ArcelorMittal II*.

As this Court had noted in *ArcelorMittal I*, ArcelorMittal from the outset had asserted only claims 1, 2, 5, 7, and 16 of the '805 patent. *ArcelorMittal I*, 700 F.3d at 1318. On remand, those claims were replaced by claims 1, 2, 5, 7, and 16 of the RE153 patent. (A4237, ¶ 14; A4306.) Defendants sought summary judgment of invalidity with respect to reissue claims 1-23, but not claims 24 and 25, which the district court *sua sponte* included in its decision. ArcelorMittal's appeal of that ruling thus necessarily included claims 24 and 25, despite the fact that it had never asserted them, and sought a remand for further proceedings with respect to those claims, including possible infringement contentions. ArcelorMittal did not state that claims 24 and 25 had been asserted (they plainly had not) or that they would necessarily be asserted on remand. Rather, ArcelorMittal sought a remand for further proceedings in which those claims, with their validity restored, could be asserted, if ArcelorMittal chose to do so by amending its complaint. As discussed above (*supra* at 21), with the issuance of the RE940 patent, ArcelorMittal chose not to seek to assert claims 24 and 25. The statements Defendants cited from ArcelorMittal's brief on appeal did not change that or amend ArcelorMittal's complaint.

3. Claim 25 is not "Substantially Identical" to any Claim of the '805 Patent.

Even applying the district court's erroneous proposition that "substantially identical" reissue claims are automatically asserted in pending litigation, the

district court erred with respect to claim 25. Claim 25 is not "substantially identical" to any claim of the '805 patent because it includes the new "composed predominantly of martensite" limitation.

"Reexamined claims are 'identical' to their original counterparts if they are 'without substantive change.'" *Laitram Corp. v. NEC Corp.*, 163 F.3d 1342, 1346 (Fed. Cir. 1998) (quoting *Seattle Box Co. v. Indus. Crating & Packing*, 731 F.2d 818, 827-28 (Fed. Cir. 1984)). "[I]n determining whether substantive changes have been made, we must discern whether the *scope* of the claims are identical, not merely whether different words are used." *Id.*

The district court provided no analysis of whether claim 25 was "substantially identical" to any original claim, erroneously believing that this was already "established by the Federal Circuit in *ArcelorMittal II* and consistent with the parties' concession." (A10 (citing *ArcelorMittal II*, 786 F.3d at 892).)[8] The district court misapprehended what this Court held (and what the parties conceded) in *ArcelorMittal II*. The district court relied on this Court's statement that "the parties concede [claims 24 and 25] maintain the same scope as the original claims." *ArcelorMittal II*, 786 F.3d at 892. But this Court earlier explained that by

[8] Indeed, prior to holding that claim 25 was "substantially identical" to the original claims, the district court had recognized that claim 25 "further limits" original claim 1 and reissue claim 24, necessarily acknowledging that claim 25 has a different scope. (A6.)

"same scope" it meant only that the parties had conceded that claims 24 and 25 were not broadened on reissue. *Id.* at 890 ("we must next determine the fate of claims 24 and 25, which both parties agree have the same scope as claim 1 of the '805 patent — *that is, they were not broadened on reissue*") (emphasis added). *ArcelorMittal II* did not consider whether the claims of the RE153 patent were substantially identical to claims of the original patent pursuant to 35 U.S.C. § 252, because that was not the issue presented on appeal; the only issue before the Court was whether the claims were improperly broadened pursuant to 35 U.S.C. § 251. *ArcelorMittal II*, 786 F.3d at 892.

Claim 25 includes the "predominantly composed of martensite" limitation that is not present in any of the original claims. This limitation was never discussed in *ArcelorMittal II*, which focused solely on whether the "very high mechanical resistance" limitation had been broadened. The new limitation in claim 25 is not merely "[a]n amendment that clarifies the text of the claim or makes it more definite without affecting its scope," *Bloom Eng'g Co. v. N. Am. Mfg. Co.*, 129 F.3d 1247, 1250 (Fed. Cir. 1997). Although it does not broaden claim 25 over the original claims of the '805 patent, it does narrow the claim to cover only certain types of steel. In particular, it distinguishes over prior art steel that used a "hot forging" process to achieve high mechanical resistance, as opposed to the "hot stamping" process used by the commercial embodiments of

ArcelorMittal's patents. (A5092.) *See ArcelorMittal I*, 700 F.3d at 1324 n.4 ("Hot forging does not involve the rapid heating and cooling of hot-stamping and does not change the steel's microstructure."). Because this new limitation affects the nature of the prior art potentially relevant to that claim, it represents a substantive change that modifies the scope of the claims.

Claim 25 is not "substantially identical" to any original claim and, even under the district court's erroneous interpretation of 35 U.S.C. § 252, was therefore never asserted in the 050 case. So, even if the district court properly refused to give effect to the covenant not to sue (and it did not), ArcelorMittal's motion to dismiss should have been granted with respect to claim 25.

II. The District Court Erred In Granting Summary Judgment Of Obviousness.

Even if the district court had not lacked subject matter jurisdiction and thus had properly reached the merits of Defendants' summary judgment motions, the court's grant of summary judgment of obviousness would still be erroneous.[9]

[9] Because the district court's summary judgment of noninfringement addressed only pre-2011-trial acts of infringement, ArcelorMittal is not appealing that judgment on any grounds other than the court's lack of subject matter jurisdiction. ArcelorMittal continues to assert infringement of the RE940 patent in the 685 case against different infringing products.

A. The District Court Incorrectly Limited its Invalidity Inquiry to the Scope of the Mandate in *ArcelorMittal I*.

The district court adopted and applied to claims 24 and 25 the jury's finding that Defendants' asserted prior art presented a *prima facie* case of obviousness as to the asserted claims of the '805 patent, and declined to consider secondary considerations of nonobviousness other than commercial success, believing that it was required to "confine [its] analysis to the scope of the Federal Circuit's mandate in *ArcelorMittal I*." (A14.) The district court erred in two respects. First, the court's decision that it was constrained by the *ArcelorMittal I* mandate was incorrect, in light of the different issue and materially different subsequent evidence made relevant by Defendants' assertion that claims 24 and 25 of the RE153 patent are invalid as obvious. Second, with respect to claim 25, the court failed to consider the new "composed predominantly of martensite" limitation that was not present in the '805 patent's claims and thus was not considered by the jury.

Under the mandate rule, a district court "must adhere to a matter decided in a prior appeal," unless certain exceptions apply. *Banks v. United States*, 741 F.3d 1268, 1276 (Fed. Cir. 2014). An "appellate mandate does not turn a district judge into a robot, mechanically carrying out orders that become inappropriate in light of subsequent factual discoveries or changes in the law." *Barrow v. Falck*, 11 F.3d 729, 731 (7th Cir. 1993). One circumstance that justifies departure from the

mandate is where "subsequent evidence presented at trial was substantially different from the original evidence." *Banks*, 741 F.3d at 1276; *see also Schneyder v. Smith*, 653 F.3d 313, 331-32 (3d Cir. 2011) (same).

The new evidence exception applied in this case. The jury's obviousness determination in 2011 was made with respect to claims 1, 2, 5, 7, and 16 of the '805 patent and was based on the district court's partially-erroneous construction of those claims. The district court applied the jury's determination in 2015 to different claims of a different patent, claims 24 and 25 of the RE153 patent, which are independently presumed valid pursuant to 35 U.S.C. § 282, without ever construing the new claims. By doing so, the court ignored a key difference between the RE153 patent and the '805 patent — namely, the additional prosecution history of the RE153 patent. In particular, the Patent Office issued the RE153 patent only after being apprised of the jury's invalidity determination and the decision and prior art at issue in *ArcelorMittal I*. (A64.) When the Patent Office decided to issue the RE153 patent, it thus presumptively considered and rejected the obviousness arguments on which the district court relied. This new evidence substantially affects the invalidity inquiry and should have been considered. *See Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1139 (Fed. Cir. 1985) (noting that "[u]pon reissue the 'burden of proving invalidity was made heavier'") (citation omitted); *Fresenius USA, Inc. v. Baxter Int'l, Inc.*, 721 F.3d

1330, 1342 (Fed. Cir. 2013) (on remand from a prior appeal, "the district court must apply intervening legal developments affecting the asserted patent's validity, even if the court of appeals already decided the validity issue the other way"). In light of this subsequent prosecution history, the district court should have allowed a new jury to consider both the *prima facie* case of obviousness and full secondary considerations evidence with respect to claims 24 and 25 of the RE153 patent.

Another constraint on the mandate rule is that it is "limited to issues 'actually decided, either explicitly or by necessary implication' in the previous litigation." *Banks*, 741 F.3d at 1276 (quoting *Toro Co. v. White Consol. Indus., Inc.*, 383 F.3d 1326, 1335 (Fed. Cir. 2004)). Because none of the original claims of the '805 patent had a "composed predominantly of martensite" limitation, no finder of fact ever determined whether the asserted prior art disclosed this limitation. Nor did any finder of fact ever determine whether secondary considerations of nonobviousness had a nexus to a claim including a "composed predominantly of martensite" limitation, and whether such secondary considerations were sufficient to overcome any alleged *prima facie* case of obviousness. Claim 25 of the RE153 patent includes a "composed predominantly of martensite" limitation. The mandate rule therefore did not constrain the district court's analysis of obviousness of claim 25. Instead, these new disputed factual issues should have been determined in the first instance by a jury.

Indeed, the district court acknowledged that the evidence in the record regarding the obviousness of claim 25 was incomplete. It noted that "[d]ependent claim 25 of the RE153 patent requires that the coated steel sheet of claim 24 be composed 'predominantly of martensite'" and asserted that "[n]either plaintiffs nor defendants address this limitation specifically with respect to invalidity." (A14 n.16.)[10] It was Defendants' burden to prove obviousness. *See Plantronics*, 724 F.3d at 1353 ("[t]he burden of proof lies with the challenger"). Because the district court recognized that Defendants failed to carry that burden with respect to claim 25, it should have denied their motion for summary judgment.

To the extent that the district court believed its ability to consider the full range of secondary considerations evidence was limited by the law of the case doctrine, the court also erred in that respect. A decision "does not constitute law of the case as to parties and accused devices that were not yet part of the litigation when that decision issued." *E-Pass Techs., Inc. v. 3Com, Corp.*, 473 F.3d 1213,

[10] The district court was mistaken in stating that ArcelorMittal did not address the "composed predominantly of martensite" limitation. ArcelorMittal had noted in its opposition to Defendants' summary judgment motions that this limitation "raises additional issues of fact regarding the combination of prior art references that disclose hot forging, rather than hot stamping" (A5092) because, as this Court noted in *ArcelorMittal I*, "[h]ot forging does not involve the rapid heating and cooling of hot-stamping and does not change the steel's microstructure." *ArcelorMittal I*, 700 F.3d at 1324 n.4. The district court was correct, however, that Defendants did not even attempt to address how the prior art purportedly disclosed the "composed predominantly of martensite" limitation.

1218 n.1 (Fed. Cir. 2007). Moreover, the reissued claims are presumed valid independently of the claims of the '805 patent that were previously at issue. 35 U.S.C. § 282(a). This Court's statement in *ArcelorMittal I* that ArcelorMittal had not briefed "other secondary considerations such as copying and unexpected results" "sufficiently to preserve them" (*ArcelorMittal I*, 700 F.3d at 1325 n.6) does not constitute law of the case for the new claims and evidence at issue on remand.

B. The District Court Incorrectly Failed to Consider the Significant Evidence of Commercial Success.

With respect to commercial success, the district court again refused to consider post-trial evidence due to its misunderstanding of the mandate rule. (A12, A14.) It declined to find any disputed issues of material fact with regard to commercial success because of an absence of evidence in the record of the 2011 trial regarding steel with mechanical resistance above 1,500 MPa. (*Id.*) But, once again, the mandate rule did not apply due to new evidence, evidence that could not have even been in existence at the time of the prior decision. *See Banks*, 741 F.3d at 1276.

Specifically, ArcelorMittal had presented a declaration from one of its employees who had observed Defendants' steel being delivered to one of ArcelorMittal's hot-stamper customers in December 2012, almost two years after the original trial. (A5088-89.) The employee also observed tensile testing results

for samples of Defendants' steel that had undergone hot-stamping, which showed tensile strength exceeding 1,500 MPa. (*Id.*) This evidence is substantially different from the prior record, which the district court found lacked evidence of steel with mechanical resistance greater than 1,500 MPa. (A12, A14.) The district court erred in concluding that the mandate rule barred consideration of this new evidence.

The observations of ArcelorMittal's employee in December 2012 were sufficient to establish a genuine issue of material fact as to commercial success of the claimed invention, particularly in light of the fact that ArcelorMittal has not had the opportunity to take any discovery regarding the post-trial period. Since the January 2011 trial, hot-stampers have been thermally treating Defendants' steel to achieve mechanical resistance greater than 1,500 MPa. ArcelorMittal submitted a declaration pursuant to Fed. R. Civ. P. 56(d) detailing the discovery that it would take and the facts it expected that discovery to show. (A4741-44; A5088-89.) The district court should have, pursuant to Rule 56(d), denied Defendants' summary judgment motion and allowed ArcelorMittal to pursue discovery to obtain additional post-trial evidence of commercial success.

The district court's refusal to consider post-trial commercial success evidence or to allow discovery regarding that subject is particularly erroneous with regard to claim 25. Section 252 allows for reissued claims to "have effect

continuously from the date of the original patent" only to the extent that they are "substantially identical" to claims of the original patent. 35 U.S.C. § 252. Because, as discussed above in Part I.B, claim 25 is not "substantially identical" to any claim of the original patent, it does not have effect continuously from the date of the original patent. It has effect only from the date of its issuance on April 16, 2013, well after the trial in the 050 case. The district court's refusal to consider and allow discovery concerning post-trial evidence of commercial success was therefore tantamount to a refusal to consider *any* evidence of commercial success with respect to claim 25. This was error, as "[i]t is the secondary considerations that are often the most probative and determinative of the ultimate conclusion of obviousness or nonobviousness." *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996); *see also InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1347-48 (Fed. Cir. 2014) ("Courts must consider all four *Graham* factors prior to reaching a conclusion regarding obviousness."); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1305 (Fed. Cir. 2010) ("[A] district court must *always* consider any objective evidence of nonobviousness presented in a case.").

C. If Summary Judgment of Obviousness is Vacated on the Merits, the District Court Should be Instructed to Dismiss the Case on Remand.

For the reasons discussed in Part I, the district court's judgment should be reversed because the court lacked subject matter jurisdiction. In the alternative, to the extent that this Court finds that the district court properly reached the merits of Defendants' summary judgment motions (which it should not), the summary judgment of obviousness should be vacated on the merits.

If the obviousness decision is vacated, the district court should be instructed to dismiss the case on remand. Even if the district court had jurisdiction over Defendants' counterclaims at the time it issued its decision, there can be no doubt that the court now lacks subject matter jurisdiction. In the district court's view, the only purported condition before ArcelorMittal's covenant not to sue on the RE153 patent took effect was the granting of ArcelorMittal's motion to amend in the 685 case. This condition has been fulfilled, and there can be no dispute that there is now no case or controversy between the parties regarding infringement of the RE153 patent. Accordingly, on remand the correct course of action would be to dismiss the case rather than to adjudicate the merits of Defendants' counterclaim for a declaratory judgment of obviousness with respect to claims that are not, and will never be, asserted against them.

CONCLUSION

ArcelorMittal respectfully requests that this Court reverse the district court's order denying ArcelorMittal's motion to dismiss for lack of subject matter jurisdiction and vacate the summary judgment of noninfringement and obviousness. In the alternative, if this Court reaches the merits of the district court's summary judgment decisions, ArcelorMittal respectfully requests that the summary judgment of obviousness be vacated, with instructions to dismiss the case on remand.

Respectfully submitted,

Dated: February 22, 2016

/s/ Constantine L. Trela, Jr. ___

Constantine L. Trela, Jr.
Hugh A. Abrams
Bryan C. Mulder
SIDLEY AUSTIN LLP
One South Dearborn Street
Chicago, IL 60604
(312) 853-7000

Jeffrey B. Bove
NOVAK DRUCE CONNOLLY
BOVE + QUIGG LLP
1007 North Orange Street
P. O. Box 2207
Wilmington, DE 19899
(302) 658-9141

Counsel for Plaintiffs-Appellants ArcelorMittal and ArcelorMittal Atlantique et Lorraine

ADDENDUM

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

ARCELORMITTAL FRANCE,and ARCELORMITTAL ATLANTIQUE ET LORRAINE, Plaintiffs, v. AK STEEL CORPORATION, SEVERSTAL DEARBORN, INC, and WHEELING-NISSHIN, INC., Defendants.	)	Civ. No. 10-050-SLR

JUDGMENT

For reasons stated in the court's order of December 4, 2015;

IT IS ORDERED AND ADJUDGED that judgment be and is hereby entered in favor of defendants against plaintiffs.

United States District Judge

Dated: 12/4/2015

(By) Deputy Clerk

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

ARCELORMITTAL FRANCE and ARCELORMITTAL ATLANTIQUE ET LORRAINE,	)	
Plaintiffs,	)	
v.	)	Civ. No. 10-050-SLR
AK STEEL CORPORATION, SEVERSTAL DEARBORN, INC., and WHEELING-NISSHIN, INC.,	)	
Defendants.	)	

ARCELORMITTAL FRANCE, ARCELORMITTAL ATLANTIQUE ET LORRAINE, and ARCELORMITTAL USA LLC,	)	
Plaintiffs,	)	
v.	)	Civ. No. 13-685-SLR
AK STEEL CORPORATION,	)	
Defendant.	)	

ORDER

At Wilmington this 4th day of December, 2015, consistent with the memorandum issued this same date:

IT IS ORDERED that:

1. With respect to Civ. No. 10-050, defendants' motions for summary judgment of no infringement (D.I. 325) and of invalidity (D.I. 323) are granted. Plaintiffs' motion to

dismiss for lack of subject matter jurisdiction (D.I. 321) is denied. Defendants' motion to change the caption to remove Severstal Dearborn, Inc. (D.I. 320) is moot, unless the parties inform me otherwise. The Clerk of Court is directed to enter judgment in favor of defendants and against plaintiffs.

2. With respect to Civ. No. 13-685, plaintiffs' motion for leave to file a first amended complaint (D.I. 31) is granted.

United States District Judge

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

ARCELORMITTAL FRANCE and ARCELORMITTAL ATLANTIQUE ET LORRAINE,	)	
Plaintiffs,	)	
v.	)	Civ. No. 10-050-SLR
AK STEEL CORPORATION, SEVERSTAL DEARBORN, INC., and WHEELING-NISSHIN, INC.,	)	
Defendants.	)	

ARCELORMITTAL FRANCE, ARCELORMITTAL ATLANTIQUE ET LORRAINE, and ARCELORMITTAL USA LLC,	)	
Plaintiffs,	)	
v.	)	Civ. No. 13-685-SLR
AK STEEL CORPORATION,	)	
Defendant.	)	

MEMORANDUM

At Wilmington this 4th day of December, 2015, having reviewed the pending motions[1] filed by the parties[2] in both of the above captioned cases, and having heard

[1]The motions filed in Civ. No. 10-050 include defendants' motions for summary judgment (D.I. 323, 325) and to change the caption to remove Severstal Dearborn, Inc. (D.I. 320), and plaintiffs' motion to dismiss for lack of subject matter jurisdiction (D.I.

oral argument on the same, I will grant defendants' motions for summary judgment and deny plaintiffs' motion to dismiss in Civ. No. 10-050, and will grant plaintiffs' motion to amend in Civ. No. 13-685, consistent with the following reasoning.

1. **Background.**[3] The above captioned litigation has a convoluted procedural history. Plaintiffs asserted U.S. Patent No. 6,296,805 ("the '805 patent") against defendants by complaint filed in January 2010. The litigation proceeded to claim construction and trial, ending in a jury verdict in defendants' favor. On appeal, the Federal Circuit upheld the claim construction in part and reversed in part;[4] the Court also reversed the jury's verdict of anticipation. With respect to obviousness, the Court concluded that a new trial was required because the claim construction error prevented the jury from properly considering plaintiffs' evidence of commercial success. *See ArcelorMittal France v. AK Steel Corp.*, 700 F.3d 1314 (Fed. Cir. 2012) ("*ArcelorMittal I*").

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321). The sole pending motion in Civ. No. 13-685 is plaintiffs' motion for leave to file a first amended complaint for patent infringement. (D.I. 31)

[2]Defendants (who may collectively be referred to as "defendants") include AK Steel Corporation ("AK Steel"), Severstal Dearborn, Inc. ("Severstal"), and Wheeling-Nisshin, Inc. in Civ. No. 10-050, and just AK Steel in Civ. No. 13-685. Plaintiffs (who may collectively be referred to as "plaintiffs") include ArcelorMittal France ("AM France") and ArcelorMittal Atlantique et Lorraine in Civ. No. 10-050; ArcelorMittal USA LLC was added as a plaintiff in Civ. No. 13-685.

[3]Given the robust record in this litigation, I recite only the facts necessary to the analysis.

[4]Specifically, the Federal Circuit reversed the construction for "hot-rolled steel sheet" and upheld the construction for "very high mechanical resistance," that is, "the flat-rolled steel has been subjected, after rolling, to additional controlled heating and cooling and has an ultimate tensile strength of 1500 MPs or greater."

2. During the appeal process, in order to "correct" the construction of "very high mechanical resistance," plaintiffs obtained U.S. Patent No. RE44,153E ("the RE153 patent"), which application issued on April 16, 2013 and added a number of dependent claims, including (1) claim 23, which recites "[t]he coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1000 MPa," (2) claim 24, which confined claim 1 to the construction affirmed in *ArcelorMittal I* by claiming "[t]he coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1500 MPa," and (3) claim 25, which depends on and further limits claim 24. *See ArcelorMittal France v. AK Steel Corp.,* 786 F.3d 885, 887-88 (Fed. Cir. 2015) (*"ArcelorMittal II"*).

3. Chronologically, then, the Federal Circuit's mandate in *ArcelorMittal I* issued on March 27, 2013 and the RE153 patent issued on April 16, 2013. Also on April 16, 2013, plaintiffs filed a complaint for patent infringement of the RE153 patent in Civ. No. 13-685 against AK Steel. (Civ. No. 13-685, D.I. 1) On May 10, 2013, plaintiffs filed a motion for leave to file a second amended complaint in Civ. No. 10-050. (Civ. No. 10-050, D.I. 269) Like the complaint filed in Civ. No. 13-685, plaintiffs' infringement contentions in Civ. No. 10-050 reflected the procedural history of the litigation. Paragraph 14 of the proposed amended complaint asserted the following:

> The RE153 patent contains claims 1-16, which originally appeared in the '805 patent, as well as new claims 17-25. Claims 1, 2, 5, 7, and 16 of the '805 patent were previously asserted in this litigation, and appear in the RE153 patent in substantially identical form. Pursuant to 35 U.S.C. § 252, this Second Amended Complaint substitutes 1, 2, 5, 7, and 16 of the RE153 patent for the same claims in the now-surrendered '805 patent.

(D.I. 269, ex. A) In paragraph 23, plaintiffs generally alleged that "AK Steel's aluminum coated, boron-containing steel sheet products . . . have an ultimate tensile strength

greater than 1000 MPa, and at least some of the products have an ultimate tensile strength greater than 1500 MPa," thus "directly infring[ing] one or more of the claims of the RE153 patent." In connection with briefing on their motion to amend, plaintiffs argued that

> [t]he landscape of this case has changed dramatically since the earlier trial. The reissue patent (RE153) has replaced the original patent (the '805 patent). Defendants no longer contend that the claims are limited to steel having a UTS greater than 1,500 MPa. Instead, Defendants have now conceded that the claims of RE153 cover steel having a UTS of greater than 1,000 MPa. And, both Defendants are **now selling** into the market steel that is being hot stamped and delivered to customers that has a UTS that exceeds 1,500 MPa.
>
> Plaintiffs' proposed amendments in the Second Amended Complaint are directed to this new landscape. . . . . First, Plaintiffs' proposed amendments that allege . . . infringement by sales of steel having a UTS of 1,000 MPa or greater are based **on the agreed substitution** of [the RE153 patent] for the original ['805] patent, and Defendants' concession . . . that the RE153 patent must be reinterpreted to cover steel with a UTS greater than 1,000 MPa. There is only a single patent, RE153, and the parties agree that it covers steel having a UTS of "1,000 MPa or greater."

(D.I. 277 at 4)(emphasis added) (*See also* Civ. No. 13-685, D.I. 10 at 8-10)

4. With the substitution of the RE153 patent for the '805 patent, defendants moved for entry of summary judgment in Civ. No. 10-050,[5] arguing that the RE153 patent was invalid pursuant to 35 U.S.C. § 251(d). By memorandum opinion issued on October 25, 2013 (D.I. 297), I granted the motion, having concluded that the RE153 patent had been improperly broadened:

> There can be no doubt that ArcelorMittal pursued its reissue patent as an intentional strategy to avoid the consequences of this court's narrow claim construction, with the ultimate goal of capturing more acts of infringement under the broadening scope of new dependent claim 23 of

[5]AK Steel filed a similar motion to dismiss in Civ. No. 13-685. (D.I. 5)

> the RE153 patent. Although such a strategy would have been perfectly legitimate if pursued within two years from the grant of the '805 patent,[6] the court concludes that ArcelorMittal's post-trial strategy offends the fundamental purpose of § 251, that is, repose.

(D.I. 297 at 10-11)[7] On appeal, the Federal Circuit affirmed in part and reversed in part:

> The district court properly concluded that claims 1 through 23 of the RE153 patent were improperly broadened under § 251 and therefore invalid. However, the district court erred in invalidating claims 24 and 25, which the parties concede maintain the same scope as the original claims. Because the district court's summary judgment orders invalidated the entire RE153 patent, we decline Appellees' invitation to reach the merits, and remand for further proceedings consistent with this opinion and our mandate in *ArcelorMittal I*.

ArcelorMittal II, 786 F.3d at 892.

5. Since the Federal Circuit's mandate in *ArcelorMittal II* issued in June 2015, the parties have filed multiple motions, with plaintiffs continuing their efforts to capture new acts of infringement and defendants continuing their efforts to enforce repose. In this regard, plaintiffs have filed a motion to amend in Civ. No. 13-685, seeking permission to assert yet another patent against AK Steel - U.S. Reissue Patent No. RE44,940 ("the RE940 patent"), a continuation of the patent application that issued as the RE153 patent and which itself issued on June 10, 2014.[8] Related to the above motion to amend, plaintiffs propose to file a covenant not to sue on the RE153 patent,

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[6]The '805 patent issued on October 2, 2001. (D.I. 1, ex. A)

[7]By memorandum and order dated December 5, 2013, all claims of the RE153 patent were invalidated as violative of 35 U.S.C. § 251(d); judgment was entered in favor of defendants, thus mooting the pending motion to dismiss in Civ. No. 13-685. (Civ. No. 13-685, D.I. 19, 20, 21)

[8]The RE940 patent has two independent claims (claims 17 and 27) which disclose, *inter alia*, a hot-rolled coated steel sheet having a "very high mechanical resistance in excess of 1500 MPa . . . ."

the filing of which is conditioned on the approval of their pending motion to amend. In Civ. No. 10-050, plaintiffs have filed a motion to dismiss for lack of subject matter jurisdiction, based on their contentions that: (1) claims 24 and 25 were never at issue in Civ. No. 10-050; (2) all of the asserted claims of the RE153 patent have been held invalid; and (3) the absence of any case or controversy requires dismissal. (D.I. 322)

6. Defendants in Civ. No. 10-050 have moved for entry of judgment with respect to both invalidity and no infringement of the RE153 patent, arguing in general that because claims 24 and 25 of the RE153 patent have the same scope as claim 1 of the '805 patent,[9] the motions are appropriately resolved consistent with the 2011 trial record and the mandate of the Federal Circuit in *ArcelorMittal I.* Specifically, plaintiffs conceded "(by not addressing) the fact that the trial record has no evidence of past infringement of claim 1 of the '805 patent, as construed by the Federal Circuit." (D.I. 297 at 5-6)[10] There being no record evidence that the accused products have an ultimate tensile strength above 1500 MPa, entry of judgment is appropriate. As to invalidity, defendants argue that summary judgment of obviousness of claims 24 and 25 of RE153 should be granted pursuant to the Federal Circuit's mandate in *ArcelorMittal I* because ArcelorMittal's "purported evidence of commercial success is insufficient as a matter of law to overcome the prima facie case of obviousness of the claims." (D.I. 324 at 1)

7. Plaintiffs in Civ. No. 10-050 counter that the 2011 trial record is an insufficient

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[9]*See ArcelorMittal II,* 768 F.3d at 891.

[10]The Federal Circuit, in *ArcelorMittal I*, affirmed the judgment that the accused products do not infringe under the doctrine of equivalents. 700 F.3d at 1321-22.

basis upon which to enter judgment, given that the RE153 patent did not issue until 2013; i.e., the record should be opened and defendants' "new acts of infringement" explored. (D.I. 331 at 11, 15) Plaintiffs also contend that

> [t]he Federal Circuit's decision in *ArcelorMittal I* held that the jury's decision in the first trial was supported by substantial evidence on the record presented to it. The Federal Circuit's decision does not establish a *prima facie* case of obviousness as a matter of law for claims that were not even before the court. A second jury that considers additional evidence based on a proper claim construction, the reissue prosecution history, the commercial success of the patented product, the copying of the patented product by Defendants, and other secondary considerations, with regard to different claims of different scope, may come to a different conclusion.

(D.I. 331 at 18)

8. **Analysis.**[11] Where to begin? In light of this procedural morass, I will begin with the original case, Civ. No. 10-050, and the statute invoked by plaintiffs when they pursued RE153 to avoid the consequences of the Federal Circuit's claim construction. Section 252 provides that when a patent is surrendered for reissue, "such surrender shall not affect any action then pending nor abate any cause of action then existing, and the reissued patent, to the extent that its claims are substantially identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent." 35 U.S.C. § 252. Claims 24 and 25 of the RE153 patent are "substantially identical" to claim 1 of the '805 patent, as established by the Federal Circuit in *ArcelorMittal II* and consistent with the parties' concession. *See* 786 F.3d at 892. Under these circumstances, I conclude, first, that claims 24 and 25 of the

[11]The court has jurisdiction pursuant to 28 U.S.C. § 1338.

RE153 patent were asserted in Civ. No. 10-050 as a matter of law.[12] Therefore, plaintiffs' motion to dismiss for lack of subject matter jurisdiction is denied. My second conclusion follows from the first: Because the RE153 patent simply took the place of the '805 patent upon its surrender - with no independent effect on any action then pending[13] - the mandate of the Federal Circuit in *ArcelorMittal I*, based on the present record, governs the resolution of claims 24 and 25 of the RE153 patent. *See, e.g., Scripps Clinic & Research Found. v. Genentech, Inc.*, 678 F. Supp. 1429, 1433 (N.D. Cal. 1988) (explaining that under § 252, "the reissue of a patent does not affect preexisting infringement claims 'to the extent that [the reissued] claims are [substantially] identical with the original patent.'") (citation omitted).

9. The record as to literal infringement is not quite as clear-cut as characterized by AK Steel, starting with the Federal Circuit's observation in *ArcelorMittal I* that,

> **[a]t oral argument, AK Steel's counsel conceded that at least some accused products have a mechanical resistance of 1500 MPa or greater.** However, as a result of the district court's incorrect claim construction of "hot-rolled steel sheet," the jury was instructed at trial to consider direct infringement only under the doctrine of equivalents. . . . Thus, there has been no determination below regarding which accused products would or would not literally infringe under the correct claim construction. That infringement issue will need to be addressed in the first instance on remand, either by the court on summary judgment or by a jury in a new trial. Because the jury found no infringement under the doctrine of

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[12]As opposed to the mechanics of filing an amended complaint. Indeed, the only reason plaintiffs filed an amended complaint in 10-050 was to assert new acts of infringement consistent with claim 23, which impermissibly broadened the scope of the '805 patent under the Federal Circuit's claim construction.

[13]Of course, to the extent plaintiffs tried to broaden the scope of the '805 patent through the reissue process in order to encompass new acts of infringement, their efforts were thwarted by the provisions of 35 U.S.C. § 251(d), as established by the Federal Circuit in *ArcelorMittal II.*

> equivalents, and ArcelorMittal has not challenged that aspect of the verdict, any infringement analysis found to be necessary on remand should be limited to literal infringement.

700 F.3d at 1322 (emphasis added). Rather than run with the ball put in play by the Federal Circuit, however, plaintiffs have tried to alter the playing field, first through the broadened RE153 patent, and now through assertion of the RE940 patent in Civ. No. 13-685.[14] Certainly in the first round of motions on remand from *ArcelorMittal I*, the focus of the litigation was whether the RE153 patent withstood scrutiny under 35 U.S.C. § 251(d) and I noted in that context that plaintiffs had conceded - by not addressing - the fact that the trial record had no evidence of past infringement of claim 1 of the '805 patent as construed by the Federal Circuit, i.e., hot-rolled coated steel sheet having an ultimate tensile strength of 1500 MPa or greater. (D.I. 297 at 5-6) Even in the current round of briefing, plaintiffs argue that genuine issues of material fact remain, but only as to "the new acts of infringement by defendants" occurring "[s]ince the time of the January 2011 trial." (D.I. 331 at 15) Given the fact that I would not allow the record to be opened on remand if the '805 patent were still at issue,[15] and given that plaintiffs are not asserting pre-trial acts of infringement, I find that there are no genuine issues of material fact as to infringement of claims 24 and 25 of the RE153 patent.

10. Likewise, with respect to the issue of invalidity, plaintiffs devote most of their current briefing to the proposition, rejected above, that claims 24 and 25 of the RE153

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[14]Ironically, had plaintiffs simply litigated the '805 patent under the Federal Circuit's claim construction, they might have a verdict by now on the alleged "new" acts of infringement rather than the instant procedural quagmire, a classic case of being hoisted by one's own petard.

[15]And recall that the RE153 patent is simply a substitute for the '805 patent.

patent are not in play in Civ. No. 10-050. (D.I. 331) Rather than address on a substantive basis defendants' position that the trial record fails to demonstrate commercial success, plaintiffs instead argue that, "[a]t a minimum, [the] additional prosecution history [resulting through reissue proceedings] creates genuine issues of material fact concerning claims 24 and 25, which were not part of the original trial or the first Federal Circuit appeal." (*Id.* at 18, citing *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1139 (Fed. Cir. 1985) ("Upon reissue the 'burden of proving invalidity [is] made heavier.'") (citation omitted). Plaintiffs contend as well that the Federal Circuit's decision in *ArcelorMittal I* "does not establish a prima facie case of obviousness as a matter of law for claims that were not even before the court." (D.I. 331 at 18) In this regard, plaintiffs suggest that "[a] second jury that considers additional evidence based on a proper claim construction, the reissue prosecution history, the commercial success of the patented product, the copying of the patented product by defendants, and other secondary considerations, with regard to different claims of different scope, may come to a different conclusion." (*Id.*)

11. The Federal Circuit in *ArcelorMittal I* upheld the jury's conclusion "that AK Steel had established a prima facie case of obviousness." 700 F.3d at 1324. Although the Court vacated the jury's obviousness verdict because of the erroneous claim construction, the Court remanded for a new trial "addressing only the commercial success aspect of obviousness. . . ." *Id.* at 1326. The Court declined to enter judgment in favor of AK Steel, as AK Steel's prima facie case was not "so strong that, as a matter of law, it would overcome ArcelorMittal's commercial success evidence." 700 F.3d at 1326. The Court also declined to address secondary considerations other than

commercial success, noting that plaintiffs had made "passing reference to other secondary considerations such as copying and unexpected results," but had "not briefed those issues sufficiently to preserve them." *Id.* at 1325, n.6.

12. The question once again is whether, under the circumstances at bar, I should allow plaintiffs to start with a clean slate, as though no trial and no appeal had ever occurred in Civ. No. 10-050. I decline to do so, and confine my analysis to the scope of the Federal Circuit's mandate in *ArcelorMittal I.* As explained by the *ArcelorMittal I* Court, "[a]bsent a demonstrated nexus, ArcelorMittal's commercial success evidence is not significant." 700 F.3d at 1326. To meet its burden of production as to nexus, plaintiffs would need evidence showing "that the product that is commercially successful is the invention disclosed and claimed in the patent." *Crocs, Inc. v. Int'l Trade Comm'n*, 598 F.3d 1294, 1311 (Fed. Cir. 2010). Defendants contend (and plaintiffs concede by not addressing) that plaintiffs only sell flat-rolled steel sheets that have not undergone additional heat treating and have not attained an ultimate tensile strength of 1500 MPa or higher, as required by claim 24. (D.I. 324 at 12-14)[16] On this record, I conclude that plaintiffs have not identified any genuine issues of material fact sufficient to overcome defendants' prima facie case of obviousness.

13. **Conclusion.** I believe that my decisions thus far bring repose to the dispute tried to a jury in 2011 and thereafter examined on appeal by the Federal Circuit, consistent with the mandates issued in *ArcelorMittal I* and *ArcelorMittal II.* I

[16]Dependent claim 25 of the RE153 patent requires that the coated steel sheet of claim 24 be composed "predominantly of martensite." Neither plaintiffs nor defendants address this limitation specifically with respect to invalidity.

acknowledge in this regard that plaintiffs may be precluded from asserting infringement in the future for hot-rolled steel sheets having an ultimate tensile strength of less than 1500 MPa, and that plaintiffs have exerted substantial resources since losing claim construction in December 2010 to achieve that very objective. Nevertheless, I conclude that defendants' motions for summary judgment in Civ. No. 10-050 should be granted and judgment of no infringement and invalidity of the RE153 patent be entered in Civ. No. 10-050, thus mooting plaintiffs' proposed covenant not to sue.[17] Plaintiffs' motion to file a first amended complaint in Civ. No. 13-685 is granted. An order shall issue.

United States District Judge

[17]Of course, if plaintiffs had simply filed the covenant instead of making it conditional, they could have avoided the entry of judgment - once again, hoisted by their own petard.

US00RE44153E

(19) **United States**

(12) **Reissued Patent**

Laurent et al.

(10) **Patent Number: US RE44,153 E**

(45) **Date of Reissued Patent: Apr. 16, 2013**

(54) **COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT**

(75) Inventors: **Jean-Pierre Laurent**, Istres (FR); **Jean-Paul Hennechart**, Floing (FR); **Dominique Spehner**, Sedan (FR); **Jacques Devroc**, Salon de Provence (FR)

(73) Assignee: **ArcelorMittal Atlantique et Lorraine** (FR)

(21) Appl. No.: **13/205,126**

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Related U.S. Patent Documents

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USPC **420/104**; 428/653; 428/939; 148/531; 148/537

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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Primary Examiner — Jennifer McNeil
Assistant Examiner — Jason Savage
(74) *Attorney, Agent, or Firm* — Woodcock Washburn LLP; David W. Schumaker

(57) **ABSTRACT**

Hot-rolled steel sheet which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

25 Claims, No Drawings

COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

The invention relates to a coated, hot- and cold-rolled steel sheet comprising a very high resistance after thermal treatment.

In this technical area, the proposed solutions involving an increase in the mechanical characteristics are accomplished to the detriment of shaping properties. There is a solution consisting in separating the shaping properties and those required for use. The characteristics required for use are obtained through a thermal treatment subsequent to or concomitant with shaping. In this case, the proposed sheets are not delivered coated because of problems of holding power of the coating at the time of thermal treatment. Coating therefore is performed on finished castings, which requires a careful cleaning of the surfaces and the hollowed portions. In addition, the thermal treatment must be performed under a controlled atmosphere in order to prevent any decarbonization and oxidation of the metal in the sheet. Steel sheets for thermal treatment do not have any pre-coating which requires post-treatments of scouring, pickling and coating.

At the time of continuous coating of flat hot- and cold-rolled products, preliminary annealing and cooling preceding or following the zinc- or aluminum-based coating operation, are used only to bring the sheet to a temperature close to that of the bath or to restore the mechanical properties of the sheet degraded at the time of cold-rolling. These thermal cycles are chosen in terms of the composition of the steel so that no allotropic transformation takes place at the time of the thermal cycle, the objective being to obtain mechanical characteristics similar to those measured on the steel sheet delivered uncoated.

The purpose of the invention is to produce a hot- or cold-rolled steel sheet of a desired thickness, coated, and affording extensive shaping possibilities and which, after thermal treatment performed on the finished casting, makes it possible to obtain a mechanical resistance in excess of 1000 MPa, a substantial resistance to shocks, fatigue, abrasion and wear, while retaining a good resistance to corrosion as well as a good capacity for painting and gluing. It also is possible to carry out hot-shaping with hardening in the tool making it possible to obtain the same properties.

The subject of the invention is a hot-rolled steel sheet, which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1% silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.01%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

The other characteristics of the invention are:

the composition by weight of the sheet preferably is the following:
0.20%<carbon<0.5%
0.8%<manganese<1.5%
0.1% silicon<0.35%
0.01%<chromium<1%
titanium<0.1%
aluminum<0.1%
phosphorus<0.05%
sulfur<0.03%
0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.

in the composition by weight of the sheet, the titanium content with respect to the nitrogen content is in excess of 3.42, the boron no longer being able to be combined with the nitrogen.

the metal bath for the coating contains in its basic composition by weight, from 9% to 10% silicon, from 2% to 3.5% iron, the remainder being aluminum.

the metal bath for the coating contains in its basic composition by weight, from 2% to 4% iron, the remainder being aluminum.

The invention also concerns a process for producing a casting starting from the coated sheet in which, after shaping, the coating of the casting is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second.

A further characteristic of the process is:

the coating and the casting are heated to a temperature in excess of 750° C.

The invention also concerns the use of the hot-rolled steel sheet which then can be cold-rolled and coated, for structural and/or anti-intrusion or substructure castings for a land motor vehicle, such as, for example, a bumper bar, a door reinforcement, a wheel spoke.

The description which follows will make the invention clearly understood.

The sheet according to the invention which derives, by reason of its processing, from a hot-rolling mill, possibly may be cold-rerolled again depending on the final thickness desired. It then is coated with an aluminum-based coating, for example by dipping in a bath containing, in addition, from 8% to 11% silicon, from 2% to 4% iron, the sheet having a high mechanical resistance after thermal treatment and a high resistance to corrosion, as well as a good capacity for painting and gluing.

The coating has in particular the function of protecting the basic sheet against hot as well as cold corrosion. The mechanical characteristics in the delivery state of the sheet according to the invention allow a great variety of shaping, in particular a deep stamping. The thermal treatment applied at the time of a hot-shaping process or after shaping makes it possible to obtain high mechanical characteristics which may exceed 1500 MPa for mechanical resistance and 1200 MPa for the limit of elasticity. The final mechanical characteristics are adjustable and depend on the carbon content of the steel and on the thermal treatment.

At the time of thermal treatment performed on a finished casting or at the time of a hot-shaping process, the coating forms a layer having a substantial resistance to abrasion, wear, fatigue, shock, as well as a good resistance to corrosion and a good capacity for painting and gluing.

According to the invention, the steel the weight composition of which is the following:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, is processed in the form of a hot-rolled and possibly cold-rolled sheet to obtain the desired thickness. The steel sheet then is coated by dipping, after pickling, in an aluminum bath containing either from 8% to 11% silicon and 2% to 4% iron, or from 2% to 4% iron, or even in an aluminum bath preferably containing from 9% to 10% silicon and 2% to 3.5% iron.

In an example of implementation of a coating of the sheet by dipping in a metal bath containing an aluminum alloy comprising a proportion of approximately 90% aluminum, the coating layer comprises a first alloy layer in contact with the surface of the steel. This layer, directly in contact with the surface of the sheet, is highly alloyed with iron.

A second coating layer, on top of the first, contains approximately 90% aluminum and may contain silicon and a small amount of iron, depending on the composition of the bath.

The first alloy layer may crack when the sheet is shaped for the manufacture of castings.

According to the invention, after the shaping of the casting, the coating is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second. This rise in temperature makes possible a rapid remelting of the aluminum which fills in the cracks generated by the operation of shaping of the casting.

Another advantage of the invention lies in the fact that the diffusion of the iron in the coating will be initiated at high temperature. One thus will have a better cohesion between coating and steel in the sheet. In another form of the invention, the thermal treatment may be performed locally, in heavily deformed zones.

In an example of implementation, the steel sheet according to the invention containing 0.21% carbon, 1.14% manganese, 0.020% phosphorus, 0.0038% sulfur, 0.25% silicon, 0.040% aluminum, 0.009% copper, 0.020% nickel, 0.18% chromium, 0.0040% nitrogen, 0.032% titanium, 0.003% boron, 0.0050% calcium is coated with an aluminum-based layer about 20 μm in thickness.

According to the invention the sheet, in the delivery state in a coil or in sheeting, the thickness of which may range between 0.25 mm and 15 mm, has good shaping properties and a good resistance to corrosion as well as a good capacity for painting or gluing.

The sheet, a coated siderurgic product, has a substantial resistance to corrosion in the delivery state, during shaping and thermal treatments as well as during usage of the finished casting. After thermal treatment, a substantial mechanical resistance, which may exceed 1500 MPa, is obtained. The presence of the coating at the time of thermal treatment of the castings makes it possible to prevent any decarbonization of the base metal as well as any oxidation. That is an undeniable advantage, in particular in the case of hot-shaping. Furthermore, heating of the treated casting does not require a furnace having a controlled atmosphere to prevent a decarbonization.

Thermal treatment of the metal in the sheet consists in a heating at a temperature ranging between Ac1, starting temperature of austenitic transformation, for example 750° C. and 1200° C., in a furnace, for a period which depends on the temperature to be reached and the thickness of the casting sheet. The composition is optimized so as to limit the enlargement of the grains at the time of thermal treatment. If the structure sought is completely martensitic, the holding temperature should be in excess of Ac3, for example 840° C., ending temperature of austenitic formation. The temperature holding should be followed by a cooling adjusted to the final structure sought. For a completely martensitic structure and for a steel having the composition of the example, the speed of cooling should be in excess of the critical speed of hardening which is 27° C./s for an austenitizing at 900° C. for 5 min., the sheet having a thickness of approximately 1 mm.

It also is possible to obtain in particular ferrito-bainitic or ferrito-martensitic structures, by a heating at a temperature ranging between Ac1, for example 750° C. and Ac3, for example 840° C., followed by an appropriate cooling. According to the level of resistance to be achieved and the thermal treatment applied, one or several of these phases is/are present in variable proportions. For the highest resistance levels, the structure is composed predominantly of martensite.

Chromium, manganese, boron and carbon are added, in the composition of the steel according to the invention, for their effect on hardenability. In addition, carbon makes it possible to achieve high mechanical characteristics thanks to its effect on the hardness of the martensite.

Aluminum is introduced into the composition in order to trap oxygen and to protect the effectiveness of the boron.

Titanium, the ratio of the content of which with respect to the nitrogen content should be in excess of 3.42, is introduced in order to prevent combining of the boron with the nitrogen, the nitrogen being combined with titanium.

The alloying elements, Mn, Cr, B, make possible a hardenability allowing hardening in the stampers or the use of mild hardening fluids limiting deformation of the castings at the time of thermal treatment. In addition, the composition according to the invention is optimized from the point of view of weldability.

The steel in the sheet may undergo a treatment for globularization of sulfides performed with calcium, which has the effect of improving the fatigue resistance of the sheet.

The steel is particularly suited to the production of structural and anti-intrusion castings.

The proposed coating makes it possible to avoid different surface-preparation operations such as for steel sheets for thermal treatment not having any coating.

The modulation of thermal treatment parameters makes it possible to achieve, with a given composition, different levels of hot and cold sheet resistance according to the thickness sought.

At the time of thermal treatment, the base coating, of aluminum for example, is transformed into a layer alloyed with iron and comprising different phases depending on the thermal treatment and having a considerable hardness which may exceed 600 HV100 g.

Table 2 presents an example of maximal resistance of the steel sheet according to the invention after thermal treatment.

Thermal treatment	Rm (MPa)
850° C./5 min.	1695
900° C./5 min.	1675
950° C./5 min.	1665

What is claimed is:

1. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.

2. The coated steel sheet according to claim **1**, wherein the composition by weight of the sheet further comprises the following:

0.20%<carbon<0.5%
0.8%<manganese<1.5%
0.1%<silicon<0.35%
0.01%<chromium<1%
titanium<0.1%
aluminum<0.1%
phosphorus<0.05%
sulfur<0.03%
0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.

3. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **2**, to an increase in temperature at a speed in excess of 600° C./second.

4. A process for producing a casting comprising
shaping the coated steel sheet of claim **2**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

5. The coated steel sheet according to claim **1**, wherein the ratio of titanium to nitrogen in the steel sheet in weight % is in excess of 3.42.

6. A process for producing a casting comprising
shaping the coated steel sheet of claim **5**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

7. The coated steel sheet according to claim **1**, wherein the aluminum or aluminum alloy coating comprises from 9% to 10% silicon by weight, from 2% to 3.5% iron by weight, the remainder being aluminum.

8. A process for producing a casting comprising
shaping the coated steel sheet of claim **7**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

9. The coated steel sheet according to claim **1**, wherein the coating comprises from 2% to 4% iron by weight, the remainder being aluminum.

10. A process for producing a casting comprising
shaping the coated steel sheet of claim **9**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

11. A process for producing a casting comprising
shaping the coated steel sheet of claim **1**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./second.

12. The process according to claim **11**, wherein the casting is heated to a temperature in excess of 750° C.

13. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to an increase in temperature at a speed in excess of 600° C./second.

14. A land motor vehicle comprising the heat treated coated steel of claim **13**.

15. A land motor vehicle comprising the coated steel sheet of claim **1**.

16. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to a temperature in excess of 750° C.

17. The heat treated coated steel sheet of claim 16, manufactured by a process comprising hot-shaping the coated steel sheet, and cooling the hot-shaped sheet at a rate that produces martensitic structures, ferrite-martensitic structures, or ferrite-bainitic structures.

18. The coated steel sheet of claim 1 that is manufactured by a process comprising providing said hot rolled steel sheet; and coating said hot rolled steel sheet with an aluminum coating or aluminum alloy coating.

19. The coated steel sheet of claim 18 that is manufactured by dipping said hot rolled steel sheet into a molten aluminum bath or molten aluminum alloy bath.

20. The coated steel sheet of claim 19 that is manufactured by pickling said hot rolled steel sheet before said dipping.

21. The coated steel sheet of claim 20 that is manufactured by cold rolling said hot rolled steel sheet after said pickling.

22. The coated steel sheet of claim 18 that is manufactured by cold rolling said hot rolled steel sheet before said coating.

23. The coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1000 MPa.

24. The coated steel sheet of claim 1, wherein said mechanical resistance is in excess of 1500 MPa.

25. The coated steel sheet of claim 24 that is composed predominantly of martensite.

* * * * *

US006296805B1

(12) **United States Patent**
Laurent et al.

(10) **Patent No.: US 6,296,805 B1**
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(54) **COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT**

(75) Inventors: **Jean-Pierre Laurent**, Istres; **Jean-Paul Hennechart**, Floing; **Dominique Spehner**, Sedan; **Jacques Devroc**, Salon de Provence, all of (FR)

(73) Assignee: **Sollac**, Puteaux (FR)

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Primary Examiner—Deborah Jones
Assistant Examiner—Jason Savage
(74) *Attorney, Agent, or Firm*—Oblon, Spivak, McClelland, Maier & Neustadt, P.C.

(57) **ABSTRACT**

Hot-rolled steel sheet which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

16 Claims, No Drawings

COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT

The invention relates to a coated, hot- and cold-rolled steel sheet comprising a very high resistance after thermal treatment.

In this technical area, the proposed solutions involving an increase in the mechanical characteristics are accomplished to the detriment of shaping properties. There is a solution consisting in separating the shaping properties and those required for use. The characteristics required for use are obtained through a thermal treatment subsequent to or concomitant with shaping. In this case, the proposed sheets are not delivered coated because of problems of holding power of the coating at the time of thermal treatment. Coating therefore is performed on finished castings, which requires a careful cleaning of the surfaces and the hollowed portions. In addition, the thermal treatment must be performed under a controlled atmosphere in order to prevent any decarbonization and oxidation of the metal in the sheet. Steel sheets for thermal treatment do not have any precoating which requires post-treatments of scouring, pickling and coating.

At the time of continuous coating of flat hot- and cold-rolled products, preliminary annealing and cooling preceding or following the zinc- or aluminum-based coating operation, are used only to bring the sheet to a temperature close to that of the bath or to restore the mechanical properties of the sheet degraded at the time of cold-rolling. These thermal cycles are chosen in terms of the composition of the steel so that no allotropic transformation takes place at the time of the thermal cycle, the objective being to obtain mechanical characteristics similar to those measured on the steel sheet delivered uncoated.

The purpose of the invention is to produce a hot- or cold-rolled steel sheet of a desired thickness, coated, and affording extensive shaping possibilities and which, after thermal treatment performed on the finished casting, makes it possible to obtain a mechanical resistance in excess of 1000 MPa, a substantial resistance to shocks, fatigue, abrasion and wear, while retaining a good resistance to corrosion as well as a good capacity for painting and gluing. It also is possible to carry out hot-shaping with hardening in the tool making it possible to obtain the same properties.

The subject of the invention is a hot-rolled steel sheet, which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%

0.5%<manganese<3%

0.1% silicon<0.5%

0.01%<chromium<1%

titanium<0.2%

aluminum<0.1%

phosphorus<0.01%

sulfur<0.05%

0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

The other characteristics of the invention are:

the composition by weight of the sheet preferably is the following:

0.20%<carbon<0.5%

0.8%<manganese<1.5%

0.1% silicon<0.35%

0.01%<chromium<1%

titanium<0.1%

aluminum<0.1%

phosphorus<0.05%

sulfur<0.03%

0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.

in the composition by weight of the sheet, the titanium content with respect to the nitrogen content is in excess of 3.42, the boron no longer being able to be combined with the nitrogen.

the metal bath for the coating contains in its basic composition by weight, from 9% to 10% silicon, from 2% to 3.5% iron, the remainder being aluminum.

the metal bath for the coating contains in its basic composition by weight, from 2% to 4% iron, the remainder being aluminum.

The invention also concerns a process for producing a casting starting from the coated sheet in which, after shaping, the coating of the casting is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second.

A further characteristic of the process is:

the coating and the casting are heated to a temperature in excess of 750° C.

The invention also concerns the use of the hot-rolled steel sheet which then can be cold-rolled and coated, for structural and/or anti-intrusion or substructure castings for a land motor vehicle, such as, for example, a bumper bar, a door reinforcement, a wheel spoke.

The description which follows will make the invention clearly understood.

The sheet according to the invention which derives, by reason of its processing, from a hot-rolling mill, possibly may be cold-rerolled again depending on the final thickness desired. It then is coated with an aluminum-based coating, for example by dipping in a bath containing, in addition, from 8% to 11% silicon, from 2% to 4% iron, the sheet having a high mechanical resistance after thermal treatment and a high resistance to corrosion, as well as a good capacity for painting and gluing.

The coating has in particular the function of protecting the basic sheet against hot as well as cold corrosion. The mechanical characteristics in the delivery state of the sheet according to the invention allow a great variety of shaping, in particular a deep stamping. The thermal treatment applied at the time of a hot-shaping process or after shaping makes it possible to obtain high mechanical characteristics which may exceed 1500 MPa for mechanical resistance and 1200 MPa for the limit of elasticity. The final mechanical characteristics are adjustable and depend on the carbon content of the steel and on the thermal treatment.

At the time of thermal treatment performed on a finished casting or at the time of a hot-shaping process, the coating forms a layer having a substantial resistance to abrasion, wear, fatigue, shock, as well as a good resistance to corrosion and a good capacity for painting and gluing.

According to the invention, the steel the weight composition of which is the following:

0.15%<carbon<0.5%

0.5%<manganese<3%

0.1%<silicon<0.5%

0.01%<chromium<1%

titanium<0.2%

aluminum<0.1%

phosphorus<0.1%

sulfur<0.05%

0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, is processed in the form of a hot-rolled and possibly cold-rolled sheet to obtain the desired thickness. The steel sheet then is coated by dipping, after pickling, in an aluminum bath containing either from 8% to 11% silicon and 2% to 4% iron, or from 2% to 4% iron, or even in an aluminum bath preferably containing from 9% to 10% silicon and 2% to 3.5% iron.

In an example of implementation of a coating of the sheet by dipping in a metal bath containing an aluminum alloy comprising a proportion of approximately 90% aluminum, the coating layer comprises a first alloy layer in contact with the surface of the steel. This layer, directly in contact with the surface of the sheet, is highly alloyed with iron.

A second coating layer, on top of the first, contains approximately 90% aluminum and may contain silicon and a small amount of iron, depending on the composition of the bath.

The first alloy layer may crack when the sheet is shaped for the manufacture of castings.

According to the invention, after the shaping of the casting, the coating is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second. This rise in temperature makes possible a rapid remelting of the aluminum which fills in the cracks generated by the operation of shaping of the casting.

Another advantage of the invention lies in the fact that the diffusion of the iron in the coating will be initiated at high temperature. One thus will have a better cohesion between coating and steel in the sheet. In another form of the invention, the thermal treatment may be performed locally, in heavily deformed zones.

In an example of implementation, the steel sheet according to the invention containing 0.21% carbon, 1.14% manganese, 0.020% phosphorus, 0.0038% sulfur, 0.25% silicon, 0.040% aluminum, 0.009% copper, 0.020% nickel, 0.18% chromium, 0.0040% nitrogen, 0.032% titanium, 0.003% boron, 0.0050% calcium is coated with an aluminum-based layer about 20 μm in thickness.

According to the invention the sheet, in the delivery state in a coil or in sheeting, the thickness of which may range between 0.25 mm and 15 mm, has good shaping properties and a good resistance to corrosion as well as a good capacity for painting or gluing.

The sheet, a coated siderurgic product, has a substantial resistance to corrosion in the delivery state, during shaping and thermal treatments as well as during usage of the finished casting. After thermal treatment, a substantial mechanical resistance, which may exceed 1500 MPa, is obtained. The presence of the coating at the time of thermal treatment of the castings makes it possible to prevent any decarbonization of the base metal as well as any oxidation. That is an undeniable advantage, in particular in the case of hot-shaping. Furthermore, heating of the treated casting does not require a furnace having a controlled atmosphere to prevent a decarbonization.

Thermal treatment of the metal in the sheet consists in a heating at a temperature ranging between Ac1, starting temperature of austenitic transformation, for example 750° C. and 1200° C., in a furnace, for a period which depends on the temperature to be reached and the thickness of the casting sheet. The composition is optimized so as to limit the enlargement of the grains at the time of thermal treatment. If the structure sought is completely martensitic, the holding

temperature should be in excess of Ac3, for example 840° C., ending temperature of austenitic formation. The temperature holding should be followed by a cooling adjusted to the final structure sought. For a completely martensitic structure and for a steel having the composition of the example, the speed of cooling should be in excess of the critical speed of hardening which is 27° C./s for an austenitizing at 900° C. for 5 min., the sheet having a thickness of approximately 1 mm.

It also is possible to obtain in particular ferrito-bainitic or ferrito-martensitic structures, by a heating at a temperature ranging between Ac1, for example 750° C. and Ac3, for example 840° C., followed by an appropriate cooling. According to the level of resistance to be achieved and the thermal treatment applied, one or several of these phases is/are present in variable proportions. For the highest resistance levels, the structure is composed predominantly of martensite.

Chromium, manganese, boron and carbon are added, in the composition of the steel according to the invention, for their effect on hardenability. In addition, carbon makes it possible to achieve high mechanical characteristics thanks to its effect on the hardness of the martensite.

Aluminum is introduced into the composition in order to trap oxygen and to protect the effectiveness of the boron.

Titanium, the ratio of the content of which with respect to the nitrogen content should be in excess of 3.42, is introduced in order to prevent combining of the boron with the nitrogen, the nitrogen being combined with titanium.

The alloying elements, Mn, Cr, B, make possible a hardenability allowing hardening in the stampers or the use of mild hardening fluids limiting deformation of the castings at the time of thermal treatment. In addition, the composition according to the invention is optimized from the point of view of weldability.

The steel in the sheet may undergo a treatment for globularization of sulfides performed with calcium, which has the effect of improving the fatigue resistance of the sheet.

The steel is particularly suited to the production of structural and anti-intrusion castings.

The proposed coating makes it possible to avoid different surface-preparation operations such as for steel sheets for thermal treatment not having any coating.

The modulation of thermal treatment parameters makes it possible to achieve, with a given composition, different levels of hot and cold sheet resistance according to the thickness sought.

At the time of thermal treatment, the base coating, of aluminum for example, is transformed into a layer alloyed with iron and comprising different phases depending on the thermal treatment and having a considerable hardness which may exceed 600 HV100 g.

Table 2 presents an example of maximal resistance of the steel sheet according to the invention after thermal treatment.

Thermal treatment	Rm (MPa)
850° C./5 min.	1695
900° C./5 min.	1675
950° C./5 min.	1665

What is claimed is:

1. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%

0.5%<manganese<3%

0.1%<silicon<0.5%

0.01%<chromium<1%

titanium<0.2%

aluminum<0.1%

phosphorus<0.1%

sulfur<0.05%

0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.

2. The coated steel sheet according to claim **1**, wherein the composition by weight of the sheet further comprises the following:

0.20%<carbon<0.5%

0.8%<manganese<1.5%

0.1%<silicon<0.35%

0.01%<chromium<1%

titanium<0.1%

aluminum<0.1%

phosphorus<0.05%

sulfur<0.03%

0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.

3. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **2**, to an increase in temperature at a speed in excess of 600° C./second.

4. A process for producing a casting comprising

shaping the coated steel sheet of claim **2**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

5. The coated steel sheet according to claim **1**, wherein the ratio of titanium to nitrogen in the steel sheet in weight % is in excess of 3.42.

6. A process for producing a casting comprising

shaping the coated steel sheet of claim **5**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

7. The coated steel sheet according to claim **1**, wherein the aluminum or aluminum alloy coating comprises from 9% to 10% silicon by weight, from 2% to 3.5% iron by weight, the remainder being aluminum.

8. A process for producing a casting comprising

shaping the coated steel sheet of claim **7**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

9. The coated steel sheet according to claim **1**, wherein the coating comprises from 2% to 4% iron by weight, the remainder being aluminum.

10. A process for producing a casting comprising

shaping the coated steel sheet of claim **9**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.

11. A process for producing a casting comprising

shaping the coated steel sheet of claim **1**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./second.

12. The process according to claim **11**, wherein the casting is heated to a temperature in excess of 750° C.

13. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to an increase in temperature at a speed in excess of 600° C./second.

14. A land motor vehicle comprising the heat treated coated steel of claim **13**.

15. A land motor vehicle comprising the coated steel sheet of claim **1**.

16. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to a temperature in excess of 750° C.

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CERTIFICATE OF SERVICE

I hereby certify that on this 22nd day of February, 2016, the foregoing Brief was filed with the Court using the Court's electronic case filing system, which will send notification to all registered users.

/s/ Constantine L. Trela, Jr. ___
Constantine L. Trela, Jr.
SIDLEY AUSTIN LLP
One South Dearborn Street
Chicago, IL 60604
(312) 853-7000

Counsel for Plaintiffs-Appellants ArcelorMittal and ArcelorMittal Atlantique et Lorraine

CERTIFICATE OF COMPLIANCE WITH FED R. APP. P. 32(a)(7)

Counsel for ArcelorMittal certifies that the body of this brief, beginning with the "Jurisdictional Statement" on page 1 and ending with the last line of the "Conclusion" on page 50 contains 11,329 words, as measured by the word-processing system used to prepare this brief, in compliance with Rule 32(a)(7) of the Federal Rules of Appellate Procedure.

/s/ Constantine L. Trela, Jr. ___
Constantine L. Trela, Jr.
SIDLEY AUSTIN LLP
One South Dearborn Street
Chicago, IL 60604
(312) 853-7000

Counsel for Plaintiffs-Appellants ArcelorMittal and ArcelorMittal Atlantique et Lorraine